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Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160. Copyright 1977 by Computerworld, Inc. All rights reserved.

50 cents a copy; \$15 a year in the U.S.; \$23 a year for Canada and PUAS; all other foreign, \$40 a year. Four weeks notice required for change of address. Please allow six weeks for new subscription service to begin.

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Congressman Vanik Charges

SSA Staff Distorted DP Use Figures

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The commissioner of the Social Security Administration (SSA) may be faced with a staff determined to distort the facts concerning charges that the agency has mismanaged its computer resources, according to the House Ways and Means Oversight Subcommittee.

In a letter to SSA Commissioner James B. Cardwell late last month, the subcommittee's chairman, Rep. Charles A. Vanik, suggested someone in the SSA deliberately misquoted the agency's computer utilization studies to convince Cardwell and Congress of SSA's need for more DP equipment and buildings [CW, Dec. 27/Jan. 3].

Vanik described misquotes from 1976 studies conducted by the General Accounting Office (GAO) and by an independent consultant using Boeing Computer Systems, Inc.'s (BCS) Systems Analysis and Resource Accounting package — reports that showed the SSA was making less than 50% effective use of the DP facilities it had then.

The misinformation was used in letters to Congressmen bearing Cardwell's signature.

While Vanik said he did not doubt Cardwell's "personal commitment to improving the full range of Social Security operations," he questioned "the commitment and quality of those who are advising [Cardwell] on computer issues."

"The system is a jerry-built cat's cradle for which there are no clear diary descriptions and which — according to oral reports I have received — has a program shutdown daily in at least one of its large systems," Vanik said.

It was GAO, not BCS, that assigned a 50% utilization figure to the SSA computer operation, as Cardwell's letter stated. Rather, BCS found the overall average utilization to be about 34%.

"BCS looked at your use of all available computer resources. GAO took the more conservative approach of looking at how much you used the resources that you used at all," Vanik told Cardwell.

"In fact, the GAO approach was admittedly so conservative that it favored SSA in every possible way — thus reaching a 50% utilization level," he continued.

GAO and BCS also looked at SSA's busiest days, Vanik pointed out. He said he

fears the GAO and BCS would have found "considerably less than 50% or 34% utilization" had they looked at "normal" or "average" days.

Letter Will Be Answered

The commissioner will answer the letter from Vanik, according to an SSA spokesman who said he didn't know when the reply would be made.

Cardwell's Nov. 15 letter to the subcommittee used the BCS study to show the GAO's 50% utilization findings were faulty. However, the BCS work was misquoted and taken out of context, Vanik's letter showed.

"The computer staff who would have allowed you to sign a letter containing these distortions appears to be doing everything possible to avoid admitting the truth of how bad the situation is and how much must be done to repair the damage to [SSA's] computer capabilities — as well as who is responsible for allowing these things to happen," he added.

If the BCS report does anything, it supports GAO's work, Vanik said. The thrust of BCS's recommendations for improving SSA's computer operations shows that "[SSA] has no record of what has been programmed into its computer or how its systems are constructed."

"I'm sorry that your staff does not accept GAO's findings. I do. If they accept the

data in the BCS report, I will accept 34% utilization instead of 50% too," Vanik said.

Vanik noted his files do not reflect Cardwell's assertion that GAO agreed with the purchase of four IBM 370/168s installed at SSA and running since the end of December.

Vanik said GAO actually "agreed that SSA had gone so far with the purchase of the four new computers that it might as well go through with the acquisition as immediate replacements for existing older systems." The agreement between GAO and SSA was that at least six or seven IBM 360/65s would be removed and the "later analysis" of utilization was to be the first task of the Mitre Corp. study, underway since mid-November, the congressman added.

Vanik said he could see "no need to continue the debate on the merit of any past study." The installation of the four 168s provides the SSA with a 40% increase in capacity which will render all past utilization figures irrelevant, he stated.

The congressman stressed, however, that the utilization data currently being collected by Mitre should be available for use as soon as possible in any Congressional appropriations debates over funds for further equipment acquisitions by the SSA.

Vanik said he would favor no new acquisitions whatsoever until the Mitre study is completed in early 1978.

\$500,000 DP Fraud Discovered

(Continued from Page 1)

several show dogs, the investigators said.

The Bangers made a \$5,000 addition to their house and purchased numerous Cadillacs, boats, a motorcycle and a gun collection, the investigators added.

Ederly is a school bus driver and her husband is a motor vehicle operator. His salary ranged from \$5,574 in 1968 to \$7,049 in 1973, the investigators learned.

Carday first discovered the Ederly account during a routine spot audit in 1975, but no file was located so the matter was dropped, Gaffney said.

A second spot audit conducted in late 1975 revealed the account again. This time the computer memory was dumped and it was found that all the checks had been made out to one person rather than a

hospital.

The amounts of the checks were relatively high compared with other accounts, so an investigation was begun.

Both the Bangers and the Ederlys were arrested in mid-December. The Bangers were arrested in Florida, where the former claims supervisor waived extradition proceedings. Her husband is fighting extradition.

In addition to the criminal charges, Carday has filed a civil suit against the Ederlys for \$536,000 to reclaim the money with interest. The Ederlys have denied any wrongdoing in documents filed in the civil suit.

None of the four indicted have a previous criminal record.

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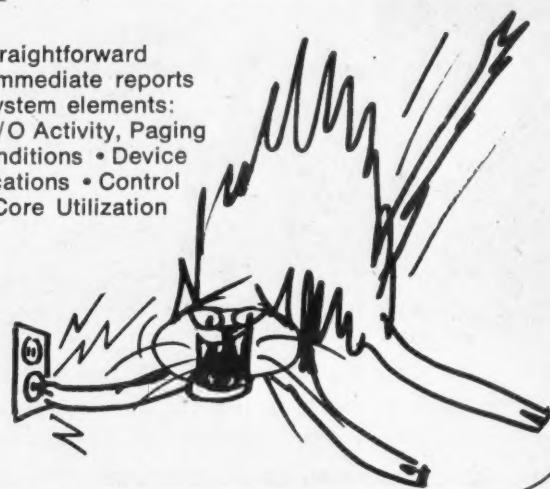
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Microprocessor Animates Winning Rose Parade Float

By Nancy French
Of the CW Staff

PASADENA, Calif. — A microprocessor-controlled life-size mother elephant, panic-stricken by a mouse on her hat and her first experience on roller skates, took the Princess Award for the best animation in the 1977 Tournament of Roses Parade here on New Year's Day.

Its builders, a student team from California Polytechnic Universities at Pomona and San Luis Obispo, have had an award-winning entry in every Tournament of Roses Parade except one since 1949, according to Ron Simons, adviser to the Students' Rose Float Committee at Pomona.

The mother elephant's animation included awkward roller skating motions as well as eye, ear and trunk movement. The laughing baby in the wagon behind her blinked its eyes and swayed its head, which was capped with a rotating propeller beanie.

The float designers dispensed with the usual flatbed truck and, instead, used a hydraulic system to propel the pachyderms down the street as well as move parts of their bodies.

The hydraulic system was controlled by a Parallel Processing System-4 (PPS-4) general-purpose microprocessor system provided by the Microelectronic Device Division of Rockwell International.

In addition to making the large number of movements economically and technically feasible, the microprocessor permitted students riding inside the float to check and correct the animation of the yellow-and-red carnation-skirted mama as she moved down the street.

Kind of Final Exam

The float's appearance in the parade was a kind of final exam for a nucleus of student workers who designed, financed, programmed and built the float for a three-

credit college course, according to Simons.

Students raised money for the project by growing, selling and bartering flowers under the schools' agricultural programs as well as by washing windows and holding bake sales, he said. This supplemented donations from alumni and businesses.

The project cost \$12,000 and is something the students could never have financed without donations, Simons said.

By comparison, commercially built floats in the parade cost their sponsors \$14,000 to \$60,000 with the big bucks going for animation and decoration, sources estimated.

Who Debugs IBM Software Used On Compatible Non-IBM CPUs?

(Continued from Page 1)

all-IBM system on a best efforts basis. But in the case of IBM software running on a non-IBM CPU, there is often no remaining IBM system to revert back to.

"Our field engineering takes responsibility the same as IBM would," an ITEL spokesman said. ITEL has both hardware and

software field engineers and if the problem is identified as a software problem, the first step will be to bypass the bug to get the customer back up.

Normally the software bug is a "soft-down" that can be bypassed to keep the customer in operation. Then the problem is reproduced to analyze the code and troubleshoot the situation, he said.

An Amdahl spokesman said his company will take full responsibility for any software problem in the operating system. "We accept responsibility for those problems and we don't think there is one that will come up that we cannot solve."

The Amdahl version of an operating system release from IBM will lag about 60 to 90 days behind the IBM version.

There are some differences between the IBM 370/168 and the Amdahl 470V/6. "They don't handle 16 channels and they don't have our machine check channel check handler code," he said.

These machine-dependent portions of the operating system are different in any model of the IBM 370 line and also are different in the Amdahl 470, he added.

"But there are no more differences between our system and IBM than there are between models in the 370 line. We do run operating systems directly from IBM systems" in some cases, he said.

IBM's Support Policy

IBM's policy on support for operating system software makes it clear that non-IBM CPUs are not covered by the company's field services in any way.

"Field engineering, including per call field engineering calls as well as central programming services, is not provided for IBM Systems Control Programming when such programming is used on a non-IBM CPU. This policy was in effect long before the current compatible CPUs were introduced," according to an IBM spokesman.

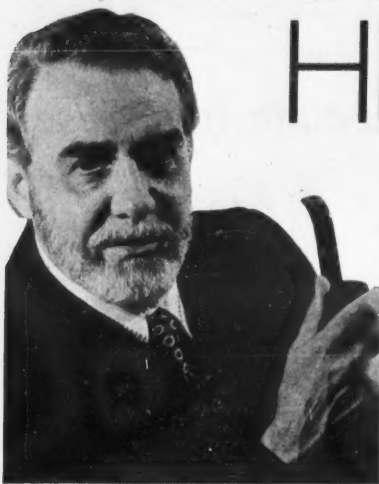
In the area of applications software or Program Products, IBM is more liberal — up to a point. "Local programming and central programming services will be provided for Program Products used on a non-IBM CPU under the terms and conditions of an amended license agreement for IBM Program Products," the spokesman said.

"In most cases this means IBM support will be limited to a review of the software documentation or machine output in the event of a problem, and IBM field representatives will not operate non-IBM systems."

The license agreements spell out the specific conditions under which IBM will provide support and may be subject to the field representative's "ability to interpret customer-provided documentation," the spokesman stated. Each Program Product is licensed to a particular customer for a specific machine.

While there are no blanket prohibitions against licensing Program Products for use on non-IBM CPUs, IBM does provide differing levels of support (for all users) depending on the classification of the particular program.

In the case of operating system bugs that occur in transparent software, there is one unofficial alternative remedy available to users. If a problem can be reproduced when the operating system is running on a 370 it will qualify for IBM support services.



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Pledge Could Shake Up Other Mainframers

IBM Agrees To Quit Sharing Directors With AT&T

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. — IBM has signed a consent agreement with the Federal Trade Commission (FTC) here barring it from having an "interlocking directorate" with AT&T or its subsidiaries — and the move could cause some shakeups on the boards of other computer mainframe manufacturers.

Companies are barred by the antitrust laws from having as directors those people who are directors of competing firms.

The reason for the restriction is apparent — if the same people are on the boards of directors of two competing companies they might conspire to divide the markets and drive other competitors out of the marketplace.

IBM has claimed that AT&T is one of its major competitors in its defense of the various antitrust cases filed against it. Yet at the same time IBM claimed AT&T as a competitor, it also had two directors that also served on the board of the New York Telephone Co., the largest operating company in the Bell System.

This led the FTC staff to file a complaint against IBM for sharing directors with a competitor — and the resulting consent order could spell trouble for others in the computer industry since at least Honeywell, NCR and Burroughs share directors with Bell operating companies.

IBM Agreement

Under the agreement which IBM signed with the FTC, the company will be prohibited from having interlocking directorates with New York Telephone, AT&T or "any subsidiary of AT&T when any of these corporations competes with IBM."

Other provisions require IBM "to adopt and enforce designated compliance procedures designed to prevent it from having illegal director interlocks with competitors in the future."

For example, the firm will have to file an annual compliance report for each of the next five years proving that it is in compliance with the order.

If IBM is found in violation of the order and the entire FTC accepts the order, IBM can be fined \$10,000 per violation.

Presently, IBM has agreed to the provisions of the order, which is on file for public comment through today. The full commission needs to review it, but since there have been no comments on the matter, that is considered routine.

In bringing forth the complaint, the FTC staff said IBM and New York Telephone compete with each other in marketing data communications terminals and that Amory

Houghton Jr. and George L. Hinman were on the boards of both companies [CW, March 22].

After learning of the FTC investigation, Houghton resigned from the New York Telephone board and Hinman resigned from both boards.

The IBM decree — in which the firm does not admit any guilt for the charges — could spell trouble for others in the computer industry because several others also share directors with the operating subsidiaries of AT&T.

While the FTC said it had "no comment" on whether it planned to pursue actions against others in the computer industry with ties to AT&T, it added it was "always interested to hear about any possible interlocks."

Since the present order against IBM

"creates a rebuttable presumption that the two companies are in competition with each other," Honeywell, Burroughs and NCR will all have to look at their relationships with other AT&T subsidiaries since all compete in the data processing/data communications marketplace.

James H. Binger, chairman of Honeywell, is on the board of directors of the Northwestern Bell Telephone Co.; Ray W. MacDonald, chairman of Burroughs, is on the board of the Michigan Bell Telephone Co. and Robert S. Oelman, member of NCR's board of directors, also serves on the board of the Ohio Bell Telephone Co.

If the regulations against IBM are to be applied across the industry, each of these people would have to either give up his position on the board of the Bell operating company or leave the firm for which he

works and on whose board he serves, sources said.

In a related case, the FTC filed charges in July 1975, claiming that TRW, Inc. and Addressograph-Multigraph Corp. (A-M) had the same individual on the board of directors of both corporations.

The FTC charged that a director interlock existed between two firms described as competing in the sale of credit authorization equipment. The complaint alleged that Horace A. Shepard served on the boards of both companies from 1971 to 1975.

A hearing on the FTC complaint before an administrative law judge of the commission is scheduled for early March.

According to an FTC spokesman, Shepard currently is chairman of the board at TRW, but he no longer holds a position with A-M.

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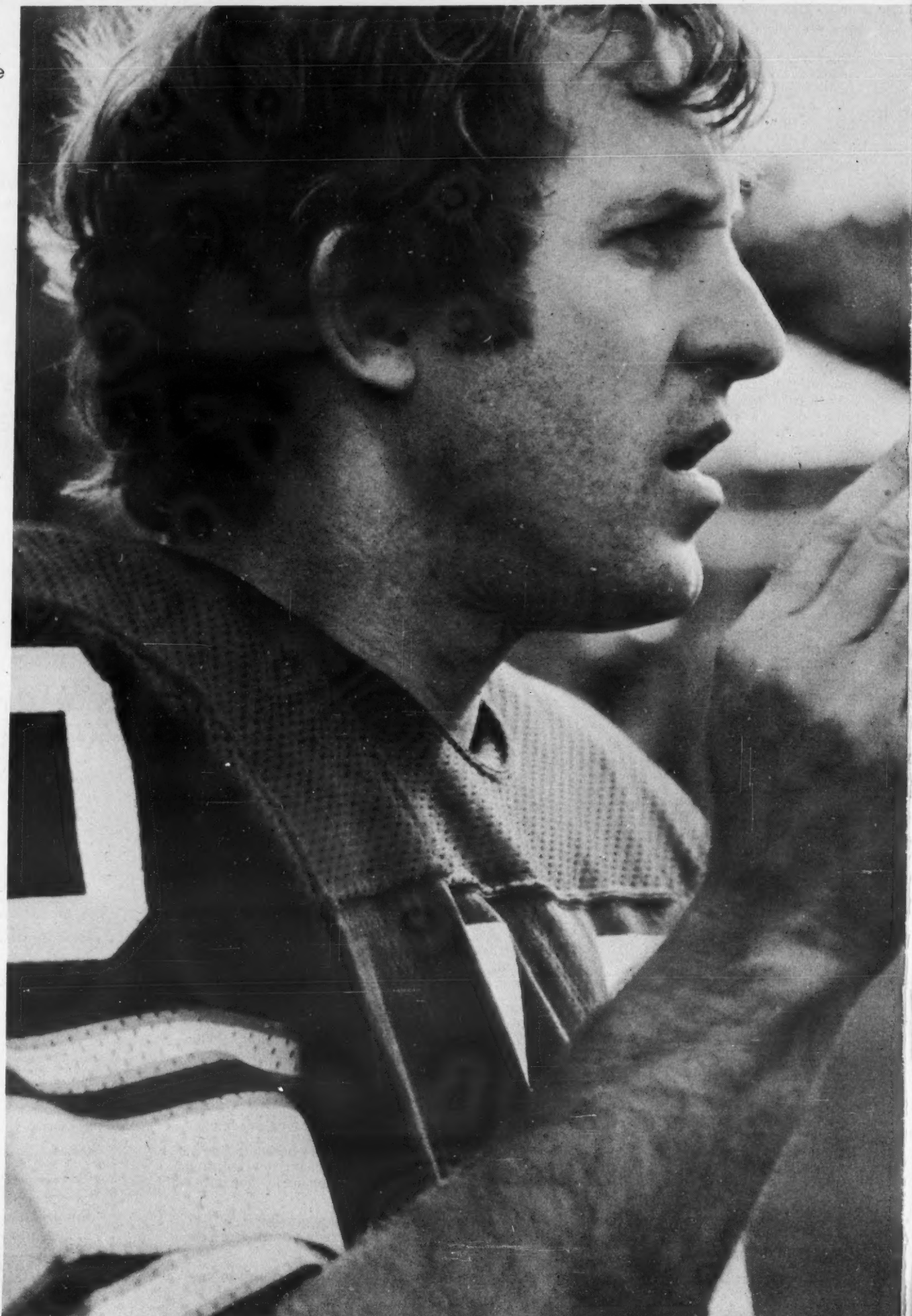
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Justice Evidence Against IBM Convincing: Franklin

By Nancy French
Of the CW Staff

BOSTON — While Justice Department attorneys deserve to be criticized for poor preparation of witnesses in their antitrust suit against IBM, the evidence they have presented so far is convincing, according to J. Thomas Franklin, attorney and IBM watcher.

"And the government's evidence, drawn principally from IBM documents, very clearly establishes the most difficult element of the case — that is, the motive and the intent of IBM managers," Franklin told a group of industry executives at a meeting here recently.

The government's pretrial brief emphasized that to maintain market control in a short-term cancellable-lease environment, a company needs to control the introduction of new technology so its old equipment stays on lease long enough to be profitable, Franklin stated.

In this context, the "famous" memorandum from IBM's Hilary Faw becomes critical to the government case, according to Franklin.

'Persuasive' Evidence

In that memo, Faw described the viability of IBM's risk lease as "dependent upon price leadership and price control and that IBM maintains such control through the timing of new technology."

"IBM fought up to the Supreme Court and back down again to keep this memo out of the case, but it was finally admitted," Franklin said.

"These are persuasive bits of evidence, sometimes lost in the forest; but isolated, I think [they] will be very persuasive to the court," he added.

The financial barrier to entry into the computer market as defined by the government "was clearly established by all of the RCA, [General Electric (GE)] and Xerox witnesses," Franklin said.

"Likewise, all of the witnesses testified pricing in the industry is set by IBM, saying [the competitors] set prices 10% to 15% to 20% lower than IBM system prices, that they reacted to IBM price changes and did not react to price changes from others within the industry," Franklin said.

Franklin reviewed the RCA and GE experiences presented to the court as examples of IBM's power to exclude competition.

In 1969, GE drew up its plans for an advanced product line, anticipating capital investment of \$500 million or more. Before proceeding, however, it convened a ventures task force to review the entire new product line.

The results of its analysis were synthesized in one sentence of its report: "Any competitive overtime will exist at the tolerance of this dominant company" — meaning IBM," Franklin said.

As a result of that evaluation, GE decided against going ahead with its advanced product line and bowed out of the DP business in 1970, the government's evidence showed.

RCA had similar technical, financial and marketing resources to qualify it as one of the most capable potential IBM competitors.

Many IBM documents evaluated RCA's Spectra equipment as superior to comparable IBM 360 models, Franklin said. Like GE, RCA set out to gain what it considered a significant market share — 10% — by marketing to IBM customers on a 15% to 20% price/performance advantage, the court learned.

When Judge David N. Edelstein asked Orville Wright, formerly a regional manager and vice-president of RCA, why RCA's objective was only 10% rather than becoming Number One in the industry, Wright answered, "You'd have to be insane to have the objective of becoming Number One," Franklin told the group.

Power Seen by Others

Further evidence of the power of IBM came out in the testimony of other main-

frame executives, according to Franklin.

Honeywell's Clancy Spangle testified that in view of IBM's \$3.5 billion in cash and cash equivalents, its 25% profit rate and its much larger installation base, IBM could reduce prices to a point where Honeywell could not sell profitably, Franklin said.

And William Norris from Control Data Corp. described the competitive impact of IBM's Model 90 against CDC's 3600 and 6600 as "enormous and disastrous" and said that after the encounter with IBM, CDC shifted away from super computers and toward the provision of data services to avoid a frontal competitive confrontation with IBM, Franklin related.

While it may be true that RCA, GE and Xerox executives believed IBM did nothing to which they could point as causing them to decide to allocate resources elsewhere, that's quite a different question from the one Edelstein has to decide, Franklin said.

U.S. Relying on Alcoa Decision

BOSTON — In prosecuting its case against IBM, the government is relying on a decision in another antitrust suit tried against the Aluminum Co. of America (Alcoa) in 1945, J. Thomas Franklin, attorney, said here recently.

In that case, Alcoa argued it was an "involuntary monopolist. It sort of fell into dominance of the market — customers love[d] it — its products [were] always best — it [couldn't] help but dominate the market," Franklin explained.

As was true in the case of Alcoa, the

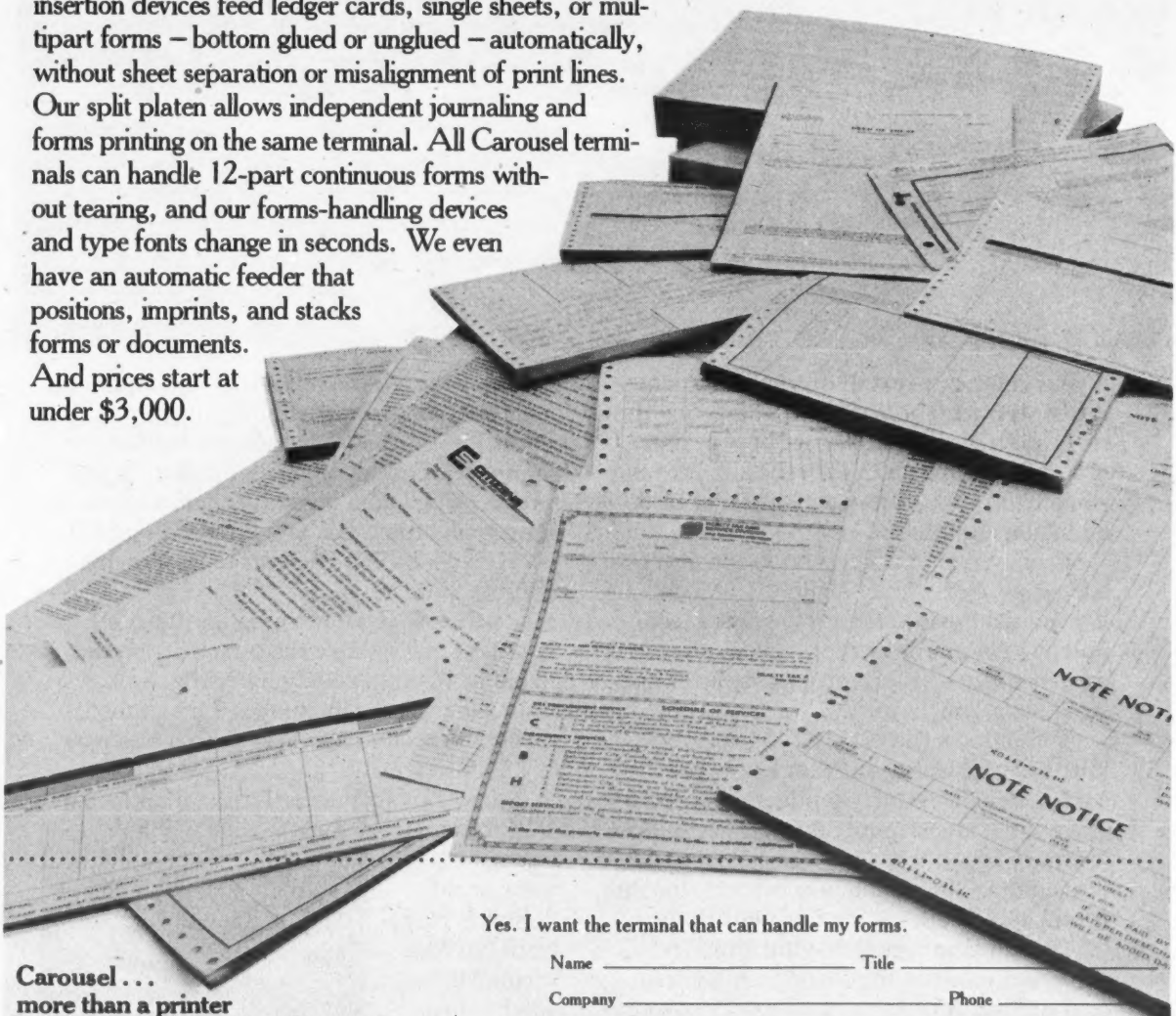
government has conceded a lot of IBM's business practices are legal or at least "not illegal;" in the total context of IBM's market power, however, those innocuous practices become antitrust violations, according to Franklin.

Alcoa lost, which indicates one does not need to break laws or do dirty tricks to be guilty of an attempt to achieve a monopoly, Franklin said. Sound, legal business practices will constitute an attempt to monopolize under the rationale of the Alcoa case, he added.

If so, maybe that market is characterized by lack of free entry or lack of any ability to stay in the market if you have entered. Maybe that market is thus monopolized and ought to be restructured, he added.

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Calcomp Expects to Wind Up Testimony by Jan. 18

By Molly Upton
Of the CW Staff

LOS ANGELES — As the California Computer Products, Inc. (Calcomp) vs. IBM antitrust case finished its seventh week, Max Blecher, Calcomp's lead attorney, told the 12 jurors he expects to conclude his case by about Jan. 18.

IBM's defense will take between four and six months, assuming the full scope of the case is still under consideration, according to IBM lead attorney David Boies.

The Calcomp case will wind up with five live witnesses, including two Calcomp sales representatives; its current chairman, Lester Kilpatrick; the employee who prepared Calcomp's damage claims; and a professor from the University of Southern California, Blecher said.

The record compiled will be the "best record in any private case," he said. The Calcomp record is so enormous, "I'm inclined to think it's not likely to be

overturned" by an appeals court, he added.

However, the instant Calcomp has finished its case, IBM will ask the judge for a directed verdict — or a ruling from the bench that Calcomp failed to prove its case, Boies said.

If IBM is unsuccessful in its motion, observers will have a chance to see IBM on the defense at least three months before it takes its turn in the U.S. vs. IBM case in New York.

IBM's first move would be to request that individual portions of the case be excised, such as disks, plug-compatible manufacturers, the 360 area and tapes, Boies said. He added he thinks there is a good chance the judge will grant such a request.

IBM has cut its witness list from 120 to about 75 or 80, and Boies expects to reduce this further.

Introductory witnesses, such as Dr. Arthur Anderson, head of the IBM San

Jose laboratory and several customer/industry representatives, may lead off the IBM case.

The alternative would be to present documents and depositions relating to Calcomp's business practices. These are intended to first present the view that it was "suicide, not homicide," Boies said.

The problem with defending is that IBM has to spend time explaining facts on the "conclusory assumptions" made by Calcomp, Boies noted.

"I am reluctant to do this in a jury trial. Inevitably, the jury will be a little unhappy as we keep them month after month," he said.

However, Boies said he hopes the jury recognizes that the case treats complex products in industry. "Our case is predicated on the theory that if we get the jury to understand, then we'll win."

"That may be wrong but that's our theory," he added.

Justice Gang Seen 'Breaking Up'

(Continued from Page 1)

time it has been in court.

He said he expects to remain active in antitrust matters, possibly as a consultant, and he would be available to consult with the government during the examination of the witnesses expected to discuss the

economics of the computer industry.

He has been devoting full time to the IBM case since it went to trial 20 months ago, leaving many of the other activities of the Special Litigation Section to his assistant for day-to-day supervision, he said.

That assistant, Burton Thorman, was also knowledgeable in the IBM case, having handled much of the early activity in the case until Carlson became lead attorney.

Widmar, who is expected to replace Bernstein in supervising the tactics and strategy used in the case, was the second in command to Carlson when the case first came to trial.

Now, ironically, Carlson will report to Widmar if the presently planned structure for pursuing the case is adopted.

Widmar, who once worked for IBM, dropped off the team pursuing IBM shortly after the trial began. After an interim period in the Justice Department here, he left to join a law firm and returned to the Justice Department last year to head the Trial Section.

Highly Unusual Move

It is highly unusual for the Justice Department's Antitrust Division to move a case from one section to another, particularly after a trial has begun, legal sources said.

The division consists of four sections, each dealing with specific industries or commodities. The Special Litigation Section has purview over the electronics field which is why the IBM case was assigned to it, the sources indicated.

While Widmar's Trial Section, under the current plan, would be in charge of the strategy and tactics of the case, the legal team would not be assigned to his division for administrative purposes, which would still be handled by the Special Litigation Branch, thus confusing matters further.

Carter Taps AT&Ter For Cabinet Position

(Continued from Page 1)

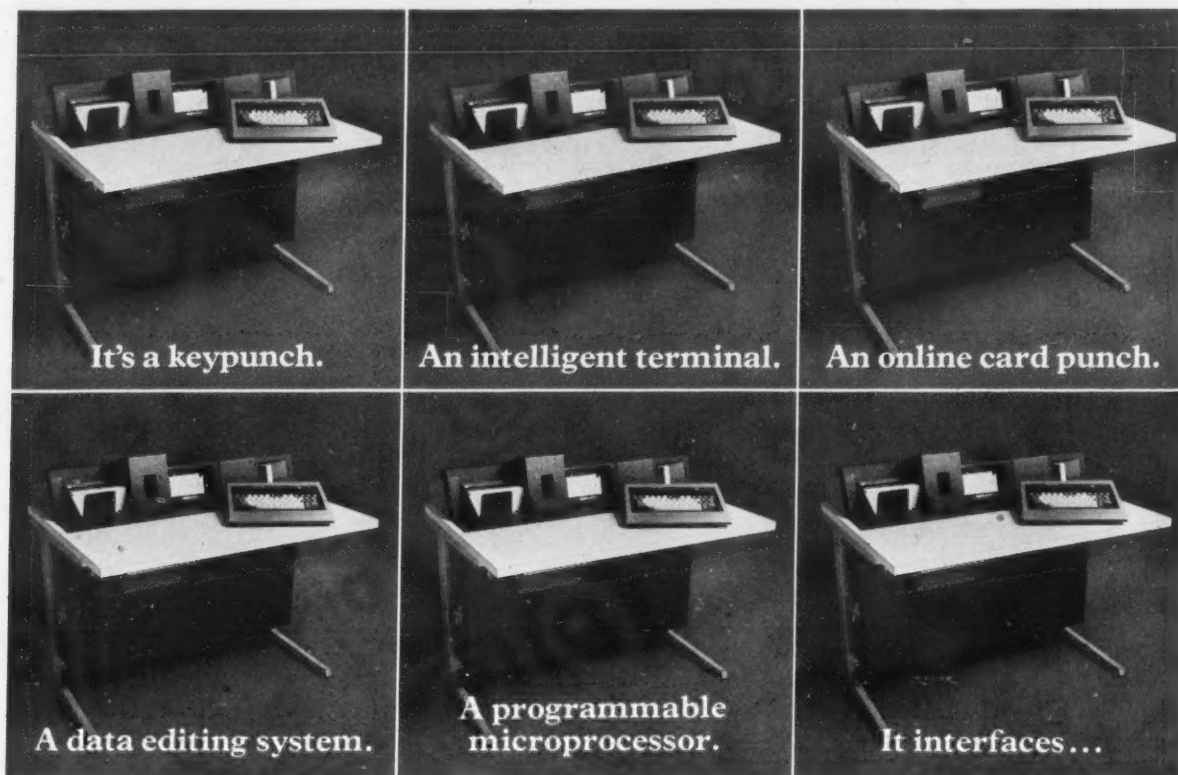
director.

The proposed Cabinet members with IBM ties include Cyrus Vance, an IBM director nominated to be Secretary of State; Harold Brown, an IBM director designated to be Secretary of Defense; and Patricia Harris, an IBM board member slated to be Secretary of Housing and Urban Development.

In addition, the nominee for Attorney General, Griffin Bell, is a partner in the law firm of King and Spalding in Atlanta and that firm is currently representing IBM on a "routine commercial matter." [CW, Dec. 27/Jan. 3].

Another IBMer with close ties to the Carter camp is Dr. Lewis Branscomb, IBM vice-president and chief scientist, who is considered one of Carter's chief advisers on science and technology policy and a top contender for the post of science adviser to the President.

Two others with IBM ties turned down Cabinet posts. Jane Cahill Pfeiffer, a former vice-president of IBM and wife of a current senior vice-president with the firm, turned down the job of Commerce Secretary, and Shapiro asked not to be considered for the post of Secretary of the Treasury.



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With Increasing Decentralization

Minis Seen Changing Role MIS Plays in Corporations

HOT SPRINGS, Va. — The minicomputer, which has begun to move into many business application areas, is challenging the traditional concept of management information systems (MIS), according to Joseph Ferreira, director of the Diebold Group's research program.

The mini has brought MIS to an important turning point and may change the relationship of MIS to a corporation, he said here recently.

Most of the 100,000 minicomputers installed today are in large corporations. While many were selected as part of a central DP facility, many were installed for use in business application areas outside of MIS control, he noted.

And this is only the beginning, according to Ferreira, who projected that 500,000 to one million minicomputers will be in use outside the traditional DP department in the next 10 years.

The MIS operating philosophy, designed for the traditional large-scale operating mode, cannot be effective in the new, increasingly decentralized user-controlled operating environment, he contended.

Distributed MIS

The time may have come to distribute the elements of MIS into user areas as the single most appropriate approach to meeting particular needs, Ferreira said.

He described MIS as "a fairly stable bureaucracy" that is subject to the same resistance to change characterizing other areas of the business. However, he pointed out, at some point in time it will have to be acknowledged that MIS can no longer maintain its traditional sphere of line control.

In the future, Ferreira predicted, organizations will integrate the development of systems resources with overall corporate planning.

Further, operation systems development resources will be centralized to accommodate a predetermined level of bottom-up user-defined needs that have broader application than to the requesting user area.

For local systems, users will assume the whole range of traditional MIS activity, operating within corporate guidelines related to information technology but subject to corporate review, he said.

A central operations activity and utility for specific needs will be maintained by MIS. Its executive will have limited essentially residual line control of MIS and will function as an "information controller," he predicted.

The corporation will increasingly adopt

Poll Finds Many Americans Concerned About Privacy

WASHINGTON, D.C. — Protecting the privacy of the individual is considered to be "very important" by 78% of the American people, according to a survey conducted by Louis Harris late last year.

The survey found privacy ranked higher than air and water quality, product safety and safe working conditions, *The Privacy Journal* reported.

Only quality of education ranked higher. Energy conservation ranked as an equally important issue in the survey.



'A...E...B...D...F...'

task forces with limited life cycles as an approach to implementing major new systems, including automated offices.

Personal 'Workstations'

Ferreira also touched on some of the ways corporations might apply information technology to become more responsive to the demands of an increasingly complex external environment.

Large comprehensive computer systems that run big organizations "have very slow nervous systems" and cannot respond

rapidly and accurately enough to rapid changes in the environment, he said.

To counter this problem, the responsive organization of the late 1970s should build more horizontally around plural decision points. Each decision point would be operated by a middle manager with his "workstation."

The types of workstations would vary, according to the Diebold speaker. Among them would be word processing, production and servicing, for example, but each one would have an information base and

criteria to measure its success.

As each personal workstation begins to make more decisions in real time, an organization will be able to respond more quickly to unforeseen events, he said.

Technologically, the personal workstation organization is already possible with the microcomputer, data bases, advanced communications, teleprocessing and distributed processing, he said.

Ferreira said his views are based on hundreds of case studies performed by The Diebold Group.

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2) The content of these books is based on an analysis of the tasks normally required of an applications programmer. That's why these books contain everything of use to the average programmer, and very little that isn't. That's also why these books give substantial coverage to job control language. The DOS book covers DOS and DOS/VS. The OS book covers MFT, MVT, VS1, and VS2.

3) These books are organized by function. A complete subset of BAL is presented in the first three chapters of the book, and later chapters cover such functions as debugging, table handling, subprogram linkage, and file handling. When material is organized in this way, you learn more quickly because you always see purpose.

4) Each book contains dozens of complete program listings. They start with card-to-printer programs and end with programs that create and retrieve direct files. In between there are listings for routines and programs that perform code translations and input validations, set up the linkage between mainline modules and subprograms, load and use tables in storage, create and retrieve sequential and ISAM files, and so on. As a result, you will have many models of professional coding techniques upon which to build.

Content

The intent of these books is to develop a basic programming skill in assembler language. As a result, the initial emphasis of each book is on a professional subset of BAL along with the related debugging skills. If you did nothing more than master this material (chapters 1-5), I think you would justify the cost of the book several times over.

Beyond this, table handling, subroutine and subprogram linkage, and sequential and ISAM file handling are given primary emphasis. Since these are common programming functions, this material is valuable background regardless of the language you normally use.

Finally, these books show you how to write macro definitions (great background for working with software packages), how to code bit manipulation and translation routines, how to isolate the fields in free-form input data (a common function in teleprocessing programs), and how to work with direct files. This type of material starts you on your way to the more sophisticated tasks required in a computer installation.

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Palmer Appointed to Take Over DPMA Executive Director Post

PARK RIDGE, Ill. — Edward J. Palmer has been appointed executive director of the Data Processing Management Association (DPMA).

Palmer replaced T. David McFarland, who has resigned.

A DPMA member for 15 years, Palmer was international president of the association in 1974-75. Prior to his appointment as executive director, he was director of administrative processing at Boston University, where he managed systems and programming personnel and engaged in design and implementation of computer systems.

Palmer holds a master's degree in business administration from Northeastern University and earned a bachelor's degree from Boston University.

He also served as a member of the Certification Council which previously administered the Certificate in Data Processing program.



Edward J. Palmer

'Chess 4.5' Sweeps Tournament

HOUSTON — Northwestern University's Chess 4.5 program was declared this year's U.S. Computer Chess champion

single move — 2,048,088.

Another first during the tournament was a computer that was programmed to graciously "resign" from play when its loss became obvious.

Societies/ User Groups

after sweeping a field of 10 contenders at the Association of Computing Machinery's conference here recently.

Chess 4.5, run on a Control Data Corp. Cyber 170 computer located in Arden Hills, Minn., linked to Houston via phone lines, has won the title six times in the seven years it has played. This year it set a record for the number of positions evaluated for a

Auditors' Deadline Extended

ORLANDO, Fla. — The deadline for registering for the 1977 Certified Internal Auditor Examination has been extended to Jan. 31.

The four-part written exam will be administered in principal cities throughout the U.S. and overseas on May 19 and 20.

Additional information may be obtained from the Professional Standards and Certification Department of the Institute of Internal Auditors, 5500 Diplomat Circle, Orlando, Fla. 32810.

Call for Papers

1977 CONFERENCE ON COMPUTERS IN THE UNDERGRADUATE CURRICULA, June 19-22, E. Lansing, Mich.

Papers should be concerned with undergraduate instruction at two- and four-year universities in a broad array of disciplines. Those from minority institutions and small colleges will be given special consideration. Because the conference emphasizes applications of computers, computer science is specifically excluded. Papers on computing services, whether from a campus center or other sources, are considered only if they have special features.

Authors should submit an original manuscript no longer than 15 pages and four copies by Jan. 15 to Gerald L. Engel, Virginia Institute of Marine Science, Gloucester Point, Va. 23062.

TRENDS AND APPLICATIONS: COMPUTER SOCIETY AND INTEGRITY, May 19, Gaithersburg, Md.

Submitted papers should be of a tutorial nature describing practical design or implementation experiences or presenting new research results.

Three copies of a 1,000-word abstract should be submitted by Jan. 15 to Peter S. Browne, Computer Resource Controls, 6 Stevens Court, Rockville, Md. 20850.

ELECTRO-OPTICS/LASER '77 CONFERENCE AND EXPOSITION, Oct. 25-27, Anaheim, Calif.

Particular emphasis is being placed on applications-oriented papers, but those of a research nature are also welcome. Those interested in participating must submit a 100- to 200-word abstract by May 1 to Technical Program Coordinator, Industrial and Scientific Conference Management, Inc., 222 W. Adams St., Chicago, Ill. 60606.

1977 INTERNATIONAL CONFERENCE ON CRIME COUNTERMEASURE SCIENCE AND ENGINEERING, July 26-29, Oxford, England.

Papers are solicited that describe recent developments in police systems; command, control and communications systems; alarm devices; computer systems security; automatic vehicle monitoring; automatic identification and authentication of voice, handwriting, fingerprints and other signatures; entry control systems; searching aids; electromagnetic spectrum conservation; communication privacy and security; pollution detection and related areas of basic science and novel applications.

A 200-word abstract is due Jan. 14 and the paper deadline is April 4. Mail abstracts to John S. Jackson, Proceedings Editor, Department of Electrical Engineering, University of Kentucky, Lexington, Ky. 40506.

1977 INTERNATIONAL MICROWAVE SYMPOSIUM, June 21-23, San Diego, Calif.

Papers are solicited describing original work which can be theoretical, technological or application-oriented. The following subject areas are particularly appropriate: computer-oriented microwave practices, microwave-oriented optical techniques, microwave high power, microwave and millimeter wave solid-state devices, applications of electromagnetics

to cancer treatment and other medical applications, microwave components and networks, microwave low noise, microwave acoustics, microwave systems including communications systems, submillimeter waves, microwave and millimeter wave integrated circuits, digital microwave systems, microwave measurements, microwave ferrites and microwave theory.

Authors must submit a 35-word abstract and a preliminary paper up to 1,000 words by Jan. 15 to Dr. Gerald Schaffner, TPC 1977 MTT-S Symposium, Teledyne Ryan Aeronautical, 2701 Harbor Drive, San Diego, Calif. 92112.

1977 MICROWAVE POWER TUBE CONFERENCE, April 26-28, Monterey, Calif.

Conference sessions will cover government long-range planning, dual-mode ECM, phased arrays, millimeter waves and general tube technology. A key conference objective is to relate Department of Defense requirements to microwave tube technology.

The deadline for abstracts is Jan. 30. Submissions should be sent to Lynwood Crosby, U.S. Naval Research Laboratory, 4555 Overlook Ave. S.W., Washington, D.C. 20390.

SPECIAL ISSUE OF IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, May 1978.

Papers that describe original work concerned with high levels of microwave power are being sought by the Institute of Electrical and Electronics Engineers (IEEE).

The papers may deal with theory or application, and topics of interest are: two-port ferrite isolators; three- and four-port circulators (passive or switched); plasma, ferrite and diode duplexers (passive or switched); multipactor control devices; PIN diodes, ferrite and YIG materials; flanges; connectors; contacts; seals, gaskets and shields; arcing, discharges and nonlinearities; intermodulation effects; thermal considerations of transmission lines; filters, cavities, diplexers and triplexers; frequency-selective ferrite limiters; transitions, hybrids, couplers and power dividers/combiners; phase shifters of diode and ferrite types; pressure windows; orthomode transducers and polarizers; antenna feeds, reflectors, antennas and radomes; high-power solid-state sources; high-power tubes and high-power microwave systems.

Authors are requested to submit three copies of the manuscript by May 15 to K. Tomiyasu, Guest Editor, IEEE Transactions on MTT, Special Issue on Microwave High Power Components, General Electric Co., Valley Forge Space Center, P.O. Box 8555, Philadelphia, Pa. 19101.

1977 SUMMER MEETING IEEE POWER ENGINEERING SOCIETY, July 17-22, Mexico City, Mexico.

Papers are invited in any area of power. Prospective authors are asked to request an author's kit which includes a declaration of intent form, a revised publication guide for power engineers discussing requirements for preparation of manuscripts, and a model paper on which the manuscript is to be typed.

Manuscripts must be received at IEEE Headquarters by Feb. 1, 1977. They should be sent to Jose A. Esteve or Elwyn G. Lambert, Technical Program Chairmen, 738 Whitaker Terrace, Silver Spring, Md. 20901.

Justice Clarifies Issues in U.S. vs. AT&T Antitrust Trial

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Some 25 months after filing the government's antitrust suit against AT&T, the Justice Department has finally sharpened the issues on which it plans to bring the Bell System to trial.

In answers to 63 questions posed by AT&T attorneys, the Justice Department recently detailed specific examples of Bell System activities it considers anticompetitive.

The suit, which calls for the breakup of AT&T, charges the Bell System with monopolizing the markets for telecommunications services and related equipment.

Justice Department attorneys said they relied on AT&T documents, material provided to the Federal Communications Commission (FCC) in various Bell System cases and interviews and correspondence since the suit was filed in November 1974.

AT&T attorneys are still reviewing the government's specific charges and will have something more to say about them soon.

Specifically, the Justice Department

pointed out several instances where it contends AT&T made it difficult for competitors to hook into Bell System facilities. In some cases, competitors were refused service even though Bell as a common carrier regulated by the FCC is obligated to make service available to all customers.

The Justice Department pointed to MCI Telecommunications Corp. in particular as an example of a firm competing directly with AT&T in private-line communications which found certain communications connections difficult to obtain from the Bell System.

AT&T's premature announcement of new prices and service is among the marketing practices which the government contends were "exclusionary" and "unfair."

The Justice Department further asserted Bell used the regulatory process to delay the entry of competition into its markets. In addition, regulation was a means "to create and exploit the conflict between state and

federal jurisdiction" to the end of harassing prospective competitors, the government said.

While delaying competitors seeking service from the Bell System, AT&T moved to develop products and services that would close those competitors out of the market, the Justice Department stated.

Furthermore, AT&T restricted its competitors' ability to obtain financing and tried to inhibit market acceptance of its competitors' services, according to the government.

The Justice Department plans to show General Electric's six-year attempt to establish a private-line network among its U.S. locations provides a model of AT&T efforts to quash its competition.

Western Electric Co., the manufacturing and supply arm of the Bell System, should be divested from AT&T and then split into two separate companies, the Justice Department said.

The government based this contention on the charge that AT&T has denied outside equipment suppliers the chance to work with the Bell System operating companies and to compete in equipment development with Western Electric.

The Justice Department believes the operating companies have refused to evaluate for purchase any equipment not made by Western Electric.

Together with its operating companies, AT&T has stunted the growth of any second-hand equipment market by refusing to sell its used and obsolete equipment to some organizations, the government charged.

The parties in U.S. vs. AT&T have set March 1 as a target date on which to begin exchanging documents, according to the Justice Department. Any problems with this document exchange will be handled by Judge Joseph C. Waddy, who is hearing the case here, at a Jan. 17 hearing.

Calcomp vs. IBM: Out of the Gate

By Molly Upton
Of the CW Staff

The California Computer Products, Inc. (Calcomp) antitrust case against IBM broke out of the starting gate at a gallop, eclipsing the scope and pace of the government's case against IBM in New York.

Whether the pace can be maintained as rapidly over the estimated four- to six-month time span of the trial, however, remains to be seen.

But the fact that the patience of 12 jurors is a key consideration in the case should serve to prod attorneys when the pace lags.

One reason the case may not finish within the estimated time table is IBM's apparent preoccupation with including terminals in the case where it suits the corporation's purpose.

Analysis

With nearly all testimony, both from witnesses and excerpts from testimony in the U.S. vs. IBM antitrust trial, IBM's lead attorney David Boies has taken longer on his cross-examination than Calcomp attorney Max Blecher, who previously made relatively succinct points on market share.

Much of Boies' extra time is devoted to chasing the terminal rabbit around the bush.

Why is IBM so interested in including terminals?

IBM is seeking to have terminals considered part of the general-purpose systems market for at least two reasons: including terminals could serve to reduce IBM's market share and might be used to prove the firm does not hold a monopoly.

IBM probably hopes to point to the number of firms that have entered the terminal arena, since one of the key criteria of a monopoly is difficult market entry.

IBM would also dearly like to have AT&T's Teletype and other terminals counted among the competition in the general-purpose systems area.

This could help reduce IBM's share not only in the terminal market, which is smaller than in the areas Calcomp is pressing, but also in the general-purpose systems market.

But IBM isn't always fond of terminals. It is anxious to have excluded from the estimated value share of the general-purpose systems market those non-IBM terminals attached to IBM CPUs; that would increase the value of IBM systems installed and, therefore, IBM's share of that market.

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Study Questions Applicability of Privacy Act to NDR

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Upgrading the National Driver Register (NDR) from a batch processing operation that shares information via the U.S. mail to an on-line system must take the Privacy Act of 1974 into account, according to a feasibility study performed recently for the National Highway Traffic Safety Administration (NHTSA).

While NDR's administrators "have always tried to follow the principles of the Privacy Act — even before there was one" and while the report compiled by Rockwell International urged the administration to "meet or exceed the broadest and strictest interpretations" of the act in designing any future system, certain characteristics of the register make the act difficult to apply.

It can be argued, the report noted, that "NDR is merely a conduit for data base activity which is in fact under state control." The states are not governed by the federal Privacy Act.

While the Rockwell report assumed the Privacy Act will continue to apply to NDR as it has in the past, the study also pointed out NDR's principal function "has obvious

law enforcement implications."

Law enforcement systems of records form the one "general exemption" category of the Privacy Act.

NDR's 5.7 million records do not represent a data bank of all licensed drivers, but rather of the 3% to 4% who have lost their licenses for some violation of the criminal code and may try to get a license in another state, an NHTSA official explained.

In the Rockwell report's survey of NDR users, most of the 56 states, territories and the District of Columbia said they do not feel constrained by the Privacy Act or federal privacy policy in their exchange of driver data. Those states that do recognize some restriction said their systems incorporate the necessary safeguards.

NDR "is simply an index to data which the users themselves have already supplied"

and they are just getting this information back from the register when they make inquiries about particular driver records, the report said.

Special Problems

The Privacy Act provision calling for data that is "accurate, complete, timely and relevant" presents special problems for NDR because, like the Federal Bureau of Investigation's Computerized Criminal History system, it relies on voluntary state participation.

But "at an absolute minimum" Rockwell urged that NDR transmit to all participating state agencies a summary statement describing the data quality standards imposed by the Privacy Act and "stressing the need for special care."

The physical and administrative security

requirements of the Privacy Act present a less serious problem because part of the NDR data is already in the public domain and none of it is highly sensitive.

"In particular, no special data encryption or other specialized data communication measures would appear to be necessary for the on-line portions of the NDR system," the study concluded.

The Rockwell report recommended use of a dedicated network for privacy and security considerations — and in particular, the National Law Enforcement Telecommunications System (Nlets).

Although the Nlets network is not subject to the provisions of the Privacy Act of 1974, it is involved in the transmission of criminal justice-related data and must follow Justice Department security and privacy regulations on such systems, the study said.

Firm Using DP to Match Students, Scholarships

By John P. Hebert
Of the CW Staff

NEW YORK — An organization here is using computer power to match college-bound high school students with details

about scholarships from some unexpected sources.

Scholarship Search, which maintains a data bank of funds offered by 250,000 clubs, associations, corporations, railroads, ethnic, social and religious groups and even individuals, provides the names of these sources to students for a fee, according to Robert Freede, who runs the organization.

The fee can be as high as \$49, but to the student who ultimately receives a scholarship, the information could be worth hundreds and even thousands of dollars, according to Freede's annual survey of 1,000 to 2,000 applicants.

To apply for a scholarship, the applicant provides his family name and history, career goals and parents' jobs along with basic name and address information.

This confidential data is coded by Scholarship Search staffers and keypunched and processed at a service bureau to match it against all scholarships and grants for which the student qualifies, Freede explained.

The applicant receives a computer print-out of the available funding sources. The rest is up to him.

If five or more sources cannot be found, the service fee can be returned, Freede said, adding the return rate is about 5% or 6%.

Freede acquired the "broken down program and ailing data bank" from a computer service bureau in 1972. The firm had developed what Freede called "a great idea," but didn't know how to market it.

"You can sell a product at a price, but you can sell an idea at a profit," he said.

Freede makes a good profit, he admitted, but could not do so without the help of a computer.

"How else can you efficiently scan

250,000 funding sources and pick 25 of the most appropriate for each applicant's qualifications?" Freede asked.

"It's also easier to update the computer file than manually do the same job," he added.

There are "many peculiar people that give money for their own strange reasons," Freede said. A judge in Seattle, for example, fines pimps \$1,500 per conviction and uses the money to maintain a scholarship fund for area prostitutes.

That fund is not listed in Scholarship Search's data bank, Freede said, but a fund from the Benedictine Brandy people for the family of the person who painted their brandy bottles is on file.

And there are scholarships available from or through Harvard for Andersons, Havens and Baxendales and from or through Yale for Deforests and Leavenworths, aside from the more usual scholarships available, Freede said.

The firm is in the process of adding new services — like a career search — and Freede is looking for other programs that could be sold to the same target group of high schoolers.

Somewhat anxious about the possibility of competition from others with access to computers, Freede said his service is "one of a kind that took hundreds of thousands of dollars to research and build."

"Nobody could begin to do what we're doing," he said.

Freede would therefore not divulge the name of the service bureau, the machine type or other "sensitive" aspects of the service or service bureau.

The reasons for this, one of Freede's co-workers said, is that "it's a very lucrative business."

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Could Put Bad Drivers Back on Road

States Threaten to Quit NDR If Service Doesn't Rally

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — More drunk and reckless drivers may be on the roads soon if the states using the National Driver Register (NDR) don't get better access and response times.

The states are unhappy with the NDR's slow batch-and-mail operation and will stop participating in the system if they don't get information faster, according to a study conducted by Rockwell International for the National Highway Traffic Safety Administration here.

NDR helps keep drunk, reckless and other bad drivers off the roads by sharing driver license information with participating states and territories. This assures that drivers whose licenses are revoked in one state will be unable to obtain a new license from another state [CW, Sept. 20].

The national service currently requires its users to mail tapes or cards on license applicants to the register for processing on two IBM 360/65s. While the present NDR batch system can process each request in 24 hours, the preparation and postal service tasks inflate total processing time to between two and three weeks.

Faster Response Desired

In a survey taken as part of the Rockwell study, 45 states said they would prefer more rapid communication with the NDR than the mail service offers, according to Jim Lockard, NDR contract technical manager.

Forty-one states, the District of Columbia and three territories were particularly interested in more rapid response to their queries on suspended or revoked driver licenses.

Many states, notably Florida and Virginia, are moving toward over-the-counter issuance of permanent driver licenses instead of issuing temporary ones. If a license applicant meets the written and driving tests required, he can walk out with his permanent license, Lockard noted.

These states want to get a response from the NDR system while the applicant is standing at the counter, he explained.

The present NDR system is also cumbersome for the citizen, he added. Lockard doesn't see "anything but benefit to the citizen" from an on-line system that will permit an individual to contest an incorrect record as soon as he learns the record is erroneous.

The survey results showed "all 41 states that expressed an interest in rapid response service will have their driver files stored and accessed through computer processing by 1978," the Rockwell report said.

"In addition, 37 of those states will have their driver files on-line and accessible from remote locations within the states by 1978."

NDR users asked for a computer-to-

Florida Forms Squad To Fight DP Fraud

ORLANDO, Fla. — The Florida Department of Criminal Law Enforcement has established a unit to investigate white-collar crime, including computer-related crime, with emphasis on organized criminal involvement.

Since such a unit requires investigators with specialized training, officers are being trained in the operation and use of computers. The unit is interested in working with other states where computer fraud has been successfully prosecuted.

The Strategic Investigation Bureau is willing to assist other law enforcement agencies as well as private industry in investigating such crimes, according to Roger D. Fields, chief of the bureau.

Fields can be reached at Suite 303, 1516 E. Hillcrest Ave., Orlando, Fla. 32803.

computer inquiry capability with response times of one minute or less. They also asked for a remote batch send/receive capability for individual and block transmission inquiries, the report stated.

In addition, the user survey showed states want to make remote batch, "after-hours" submissions of license withdrawal, restoration, correction and cancellation data to the NDR file, it said.

The states would also like to be able to make occasional "selective inquiries" of current or historical records as well as gain the ability to return driver license application responses to NDR in on-line and off-line modes. Further, users would like to use an on-line NDR system for administrative traffic and some message switching.

Finally, the states want "a minimum of disruptions and costs incurred in achieving

an interconnect between user computers and NDR, with system standards and conventions requiring minimum conversion and reprogramming," the report said.

To meet these user needs, the NDR system will have to include a communications network linking the 41 states to the NDR central computer here; a data base that is randomly distributed on mass storage devices and is structured to permit retrievals by various keys; an improved name search and matching methodology to process both on-line and batch transactions; and a host processor with adequate core and processing speed to handle the estimated traffic within the requisite response times, the Rockwell report said.

It suggested the National Law Enforcement Telecommunications System (Nlets) is "the most suitable alternative" to meeting

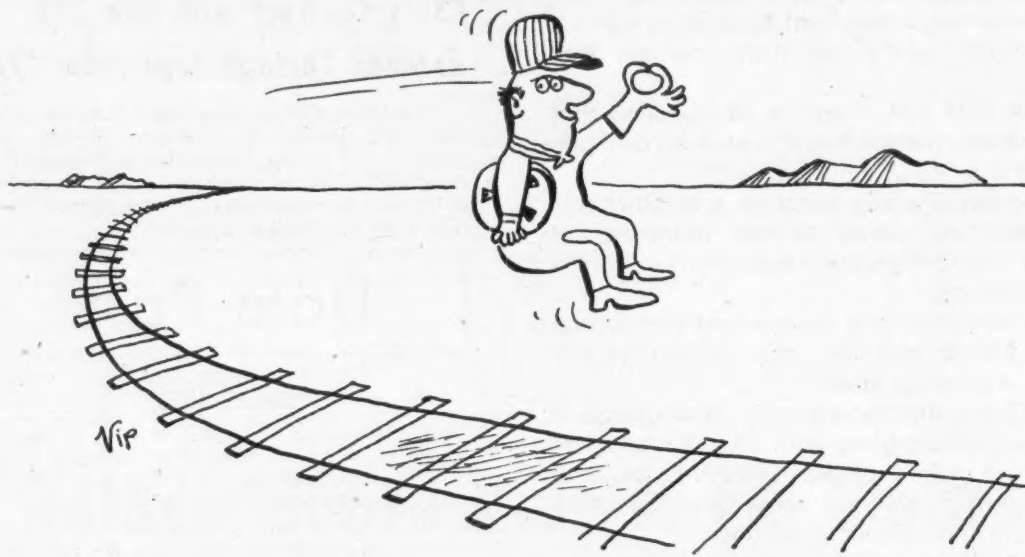
the communications needs of an enhanced NDR system because Nlets would be less expensive than leased lines or Telenet.

Nlets will be more expensive than NDR's present way of processing license information inquiries and submissions, however. It will cost almost \$1 million more per year than the present NDR system will cost in the fiscal year beginning Oct. 1, 1984, the report noted.

The Nlets alternative was estimated at \$2.8 million for that year, while the existing NDR system is expected to cost \$1.87 million annually by then.

Lockard said if the National Highway Traffic Safety Administration takes the Rockwell study's advice and moves forward, the administration would hope to have an enhanced NDR up and running in the pilot stage in the latter part of 1980.

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Editorial

Waiting Patiently

The Justice Department antitrust suit against AT&T apparently is based on carefully researched actions which the government claims were taken by the phone company to perpetuate its total monopoly position (see story on Page 11).

When the suit was first filed in late 1974, there were some who felt the same questions about vertical integration in the Bell System would be discussed.

These issues had been thrashed out many times before in earlier AT&T antitrust actions and in Federal Communication Commission (FCC) proceedings, one of which (the Phase II study) is still pending.

But based on a 500-page response filed with the U.S. District Court by the Justice Department, the upcoming suit will document government claims that AT&T made research and management moves to eliminate FCC-sanctioned limited competition.

The Justice document is comforting to those who feared the department's resources might be strained by having concurrent suits going against two monolithic giants like IBM and the Bell System.

Unlike the IBM suit, there is no question that AT&T dominates the market. It is as John de Butts likes to call it, a "natural monopoly."

In this context, the key question is whether this market structure works to the detriment of customers having the widest availability of equipment and options.

The FCC has obviously determined that a total monopoly should give way to a competitive environment in selected areas.

AT&T will argue that the marginal performance of the new competitors gives new risks to users. The other side will claim that failures such as the Data Transmission Co. (Datran) are a direct result of AT&T control and predatory actions.

A final resolution is still years away. Now that the court has disposed of jurisdictional questions, it appears ready to begin the discovery phase.

The problem with the slow legal process is that it hurts the competitors while helping the entrenched leaders. This is the case in the IBM suit, where market conditions are now being discussed that seem obsolete in the fast-moving technology of computers.

In the same way, modem competition may seem old hat when it comes up in the AT&T trial if all-digital nets are then prevailing. Hopefully, the AT&T suit will be heard in a speedier time frame than the IBM treadmill.

The IBM suit will determine how far a dominant supplier can go in a competitive environment. The AT&T suit will indirectly examine whether regulation in its current form under the Communications Act of 1934 has worked in the public interest. It may be that the regulatory framework has been abused for corporate gain.

These types of issues seem to be light-years removed from the daily business problems of users. But market structures for many years could be determined by both these suits. And the costs of hardware, software and all other services are based on the competitive forces at work.

The fates of the computer and communications industries wait patiently while the lawyers earn their expensive fees.



Letters to the Editor

CSC's Contract with the GSA Extends Through September '77

"GSA Opens Federal Teleprocessing Arena" [CW, Dec. 20] stated the General Services Administration's (GSA) Teleprocessing Services Program (TSP) "fills the void created by the expiration of the GSA contract with Computer Sciences Corp. (CSC) and its Infonet on June 30."

Because that statement could create misunderstanding and confusion among *Computerworld* readers in the Federal Government, I would like to point out that CSC's National Teleprocessing Services contract, initially awarded in 1972, has not expired, but extends through September 1977 with an option for an additional one-year renewal. We are continuing to serve federal agencies under that contract.

In addition, CSC has received a Multiple Awards Schedule contract and signed the basic agreement under GSA's TSP, enabling Infonet to compete for additional business among federal agencies.

Incidentally, we welcome the introduction of TSP because Infonet much prefers to be competitive in a large market than mandatory in a small one.

As to the size of that market, the federal Office of Management and Budget has estimated the government is currently spending about \$125 million annually on outside remote computing services and expects this figure to reach \$200 million by 1978.

John W. Luke
President

Computer Sciences Corp.
El Segundo, Calif.

Contradictory Behavior

The editorial cartoon in the Dec. 27-Jan. 3 issue reflected the view that ties of members of the Carter Administration with IBM may impede the U.S. vs. IBM antitrust suit.

Implied in this is the view that when a man leaves the employ of IBM, he necessarily continues to act and feel like a loyal IBMer.

On the facing page, Joseph T. Rigo reported that Max Gould, an ex-IBM'er now at Citibank, was instrumental in junking all the big IBM mainframes.

Isn't there a contradiction here?

Harry Nagler

New York, N.Y.

Further Clarification Needed

In his column, "Confusing Percentages Surround Overbooking Problem" [CW, Dec. 20], Alan Taylor did little to clarify the confusing percentages given by the airlines.

Aside from the two different figures he gave for the number of enplaned passengers for Allegheny Airlines, my rough calculations show that at the rate of .3 denials per 10,000 enplanements, one would anticipate 325 denied boardings for 10,829,582 enplanements, yielding a 1.450% increase.

Compared with the figures given — 3,249 denied boardings per 10,829,582 enplanements, giving a 55% increase — the contrast is striking.

Taylor's calculations would be correct if the 1974-75 figures were 3 instead of .3 per 10,000 enplanements. If this is not a typographical error, then perhaps there has been a substantial decrease in the efficiency of the airline's overbooking algorithms.

Stephen Asakawa
San Diego, Calif.

Data Past

Five Years Ago
Jan. 12, 1972

LOS ANGELES — Anxious brokers ran to the streets in search of punched cards listing shareholders and their holdings. The cards had been inadvertently mixed with confetti and ticker tape during a New Year celebration in the Los Angeles financial district and belonged to a firm specializing in proxy solicitations.

WATERTOWN, N.Y. — The county director of data processing and half his staff were suspended for operating a service bureau in the Jefferson County DP Center.

The director pleaded guilty to "theft of services," a misdemeanor, and was fined \$500, according to District Attorney William J. McCluskey.

The county employees were providing computer services to local industry during and after working hours.

Eight Years Ago
Jan. 15, 1969

NEW YORK — IBM's maintenance and software practices were attacked in an antitrust suit filed in federal court here Jan. 3 by Data Processing Financial & General (DPF&G).

IBM denied that it violated the antitrust laws and stated that "DPF&G's allegations were completely without merit."

DPF&G claimed actual damages of \$351.5 million and asked for \$1.05 billion as antitrust penalty. The firm also asked for \$1 billion in exemplary and punitive damages.

In addition, DPF&G asked the court to separate IBM into four competitive entities: IBM, the Leasing Corp., the Maintenance Corp. and the Software Corp.

LOS ANGELES — Information International introduced a microfilm recorder capable of printing up to 20,000 line/min — 10 times the speed of an IBM 360 using three magnetic tapes and two 1,100-line/min printers.

The device, called the FR-80, had a resolution of 16,384 by 16,384 programmable points, better than or equal to that of a 4-ft by 4-ft flat-bed plotter.

Communications Essential

Guiding People, Not Machines, Real Job of DP Manager

By Jack Stone

Special to Computerworld

Is "communicating with other people the real job of computing?"

The quotation in this question was extracted from a fascinating and provocative letter from a reader to the editor of the *Installation Management Review*, a publication of the Association of Computing Machinery (ACM) Special Interest Group on Computer Systems Installation Management, which appeared in the most recent issue (Oct. '76).

Inasmuch as the editor has solicited comments on the letter, I am taking the liberty of responding in a public fashion so that *Computerworld* readers can participate in the discussion.

Excerpts from the letter are presented in their original form, each one followed by my commentary.

Item: We've developed, as a profession, almost no professional recognition for organizational, administrative or personnel skills. What little activity there is is chiefly between the covers of Gerald Weinberg's book, The Psychology of Computer Programming, or in the ACM's Special Interest Group on Computer Personnel Research (Sig CPR).

Hardware and software dominate professional activity. And, too, the typically successful and humanly sensitive DP manager who keeps his people from each other's throats for, say, a five-year period gets no external recognition.

That task, however, given deadline pressures, perfectionistic pressures and odd-hours pressures, is heroically significant.

Comment: The assessment is right on target. Let me share some of my recent experiences regarding the current state of affairs.

When I decided that I wanted to write about the human aspects of the DP center, I naturally researched every professional and trade publication in the industry and found no publication had a strong commit-

ment to this subject, except for the ACM Sig CPR and CW through its "Peopleware" series (which has undergone a name change to "The Human Connection").

I wrote to every trade publication early in the year, proposing a regular series of articles dealing with nontechnical management and personnel topics of interest to the trade. CW accepted the idea immediately; all the others sent rejections presumably on the

Code standardization, principles of code simplicity, comprehensive documentation and significant user involvement have all been established as principles, with great grumbling among computer people.

Sometimes I'm not sure anyone believes that communicating with other people is the real job of computing.

Comment: I agree with the theme, but the terms used are somewhat ambiguous.

failures of technically oriented DP managers to meet established goals, hired a DP manager with no particular technical experience in the DP center, but who had an excellent record of success as a "manager". How did he do it? He concentrated on the people "problems" and brought in his technical specialists to resolve technical problems.

Item: Support work required to lead and encourage humans is deadly dull. It involves great care, great personal discipline and great gobs of bureaucratic folderol. It means spending personal time on overhead functions.

Establishing job descriptions is harder than writing specifications for a new piece of hardware. For most organizations, it is more tedious and time-consuming to correct a salary inequity than to order a new computer. The processes of being fair and of caring for human concerns are very grinding within most organizations.

It is my feeling that we are a long way from the proper consciousness necessary to deal with human problems in the computing environment. We really do need to yell louder.

Comment: In my judgment, the job of the DP manager is the toughest in American industry or government today. I never said it was easy or as much fun as analysis or programming. However, until the senior DP manager "yells" upstairs for more support to help solve his human problems, he will continue to suffer the pangs of job insecurity.

One concluding remark: The author of the letter quoted above preferred to be anonymous. I hope that this column, in some small way, will help to bring these issues and their authors out into the open.

Readers are invited to send letters to be answered in this column, as they pertain to management and human relations issues in the DP setting. Please address letters to Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

The Human Connection

basis of their judgment of the lack of reader interest.

As another demonstrated lack of attention to the professional character of management and personnel leadership skills, the proceedings from the 1976 National Computer Conference (NCC) contained 136 papers, of which none was devoted to human relationships in the DP center (aside from several papers on DP training).

However, there are some bright spots in this somewhat gloomy picture. Robert Korfhage, the NCC '77 program chairman, fully recognized the need for the academic community and the computer professional societies to begin to turn some energies toward understanding and improving the human aspects of the DP management process.

Toward this goal, he has organized a panel session for NCC '77 dealing with human perspectives in the computer center and has invited me to chair the panel. (My thanks to Karen Duncan, assistant professor at the Medical University of South Carolina, who sparked the idea.)

Item: There is a common denial that computing is a social activity. Only recently have there been discernible trends toward the view that computing is not a closet activity done for one individual's ego amusement.

Computing — as a machine activity — is clearly a technology process. Organizing and directing people and machines together as computing systems to meet specific goals is a social process.

The real job of the DP manager is managing people, not machines; the manager must achieve results and meet goals by effective planning and control of the people resources. Communications is the basic technique used by managers for directing and leading the DP people.

As a corollary, and let me say it once and for all, the DP manager who cannot, does not or otherwise fails to handle the DP personnel effectively is a failure as a DP manager, regardless of his technical competencies.

Item: The person who recognizes computing as a social activity becomes slowly disheartened by the mass of technical detail needed for decision making.

For example, he can't negotiate procedures... on the basis of skilled communication and arbitration alone; he is expected to also fully understand the technical constraints of all levels of software and hardware affected. Negotiation is tough enough by itself.

Comment: The most spectacular success story relating to a DP manager is the one where a well-known bank, after a series of

Protects Valuable Factor

Don't Forget the Golden Goose Rule in FM Contracts

Facilities management (FM) contracts across the industry are certainly not standard. In fact, some of the ones I have come across have shown the most amazing variations.

Anything from the briefest statement, "You will run our DP shop for us," to multipage legal gobbledegook with appendixes and references to other documents — sometimes even including general correspondence — can be found by those who care to look.

Sometimes certain firms have a standard contract, but this appears to be more as the basis of starting negotiations rather than as what the facilities management client is expected to accept.

But despite all the variation of contract conditions, there appears to be one major common deficiency that helps no one.

Its lack, in fact, may be the reason why FM has not progressed further than it has, despite the evident common sense that use of top expertise to run a number of DP departments is potentially more worthwhile than simply relying on growing skills nurtured within a single firm.

Lack of Provisions Evident

In all the contracts that I have seen, the lack of any reasonable provisions for the

protection of the DP operation itself (i.e., "Golden Goose" clauses) has been evident.

Golden Goose clauses are used to protect some outside factor which is valuable to both parties to a contract, so that no matter what happens between the two contracting parties the essential value of the Golden Goose remains intact. Oil wells, trade secrets and other precious but essentially vulnerable assets can be regarded as Golden Geese.

Why Golden Geese Overlooked?

Before going on to consider suitable Golden Goose clauses for facilities management contracts, it is worthwhile considering both why they are often overlooked and why they shouldn't be ignored.

A common, nearly equivalent case — making a will and leaving one's possessions to one's children — may explain the situation.

As any lawyer can tell you, the idea of any unreasonable happening — such as a child dying before his parents — is uncomfortable to think about. One who is prepared to contemplate his own death just does not like being faced with such situations and much prefers to ignore them.

Normally, there is no harm done. Everything goes along smoothly and the children stay alive. But from the professional viewpoint of writing the will, the avoidable possibility of chaos remains, just because the idea was unpalatable.

Similarly, it is very unpalatable to consider that future trouble is even possible in an FM contract — particularly at the time

the contract is being drafted. And this appears to be the basic reason for the incredible failure to cover this possibility.

There are, in fact, three types of clauses needed to provide really complete Golden Goose protection: the trigger notification area, the transition area, and the divorce and alimony area.

The trigger notification clause provides for some formal letter from the user to the facilities management people stating the user intends to take over his own DP again.

This clause can include items such as nomination of people to lead a transition operation, details and dates of take-over intentions, etc. However, these are minor by comparison to the major item — a formal notification of intent.

The transition clauses are inevitably more complex than the trigger notification clauses and include a number of areas that should be addressed. Who, for instance, should pay for the transition costs? What happens if a data file is out-of-balance? How is testing to be checked out? What length of parallel is sufficient?

Real Financial Contribution

In general, it seems reasonable that the user makes a real financial contribution to the transition under these circumstances. Both user and FM people have an equal responsibility to ensure that all appropriate tests are made and that the transition is successful.

A further task in the transition area is the safeguarding of everyone's rights in the future. What will be needed here cannot be forecast, but various items will almost cer-

tainly be wanted by both sides.

Copies of programs, files, reports, letters, correspondence, timings and logs may all be wanted. Provision should be made for such items to be provided to either side on request (with perhaps special provision for paying the costs involved).

This may seem unnecessary, but it is probably essential to the success of the transition arrangement. Any "dog in a manger" attitude of trying to keep this type of information secret can poison the atmosphere — and transitions are dangerous things at the best of times.

Divorce & Alimony

So far, the Golden Goose clauses have in effect been avoiding the reality that a disagreement has occurred. This cannot be avoided too long and now is the time to consider what the rules are going to be, in case they are needed.

In some cases, they may never be used. Both sides may be happy to walk away from the situation. This cannot be assumed, however, and provisions must be made.

Such items can include the consideration of arbitration as an alternative to use of the courts and other legal matters. The lawyers should get together about this area.

So, there you are. Don't forget the Golden Goose; it's a valuable bind.

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The Taylor Report
By
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Women Upstage Men

Novice DP Majors Outscore Veteran DPer

By Jack M. Wolfe

Special to Computerworld

Using a programming aptitude test which I developed and which was validated by a U.S. government agency, it was found that a group of computer science majors with no actual work experience who were applicants for programming positions in 62 companies and government agencies rated higher than a group of applicants with actual programming experience.

Although there was considerable overlapping of the two groups, 49% of the 200 computer science majors were rated as superior by the test while 39% of the 473 experienced programmers scored in that range.

The superior range corresponds to the scores of the highest 30% of the norm group of more than 2,700 programmers and programming trainees in more than 300

companies and government agencies.

Some companies that do not have their own training programs often will employ only experienced programmers. These companies are letting superior applicants slip through their fingers.

The graduate of a four-year course of study such as a com-

puter science major at a professionally recognized institution will often need only minimal organized training or none at all. These persons with good college records in their major can generally learn well on the job and from books and manuals.

factors in his selection procedures to include a qualitative evaluation of the applicants' accuracy, precision of interpretation of specifications and logical capabilities for the work of programming.

In a comparison of men and women applicants in both groups, that is, the group of experienced programmers who were seeking a

women's group.

It is of interest to note that the women constituted 24% of the new entrants into programming from the computer science college graduate group. In the group of experienced programmers seeking a change of job to another company, however, only 22% were women.

Thus, from the data, there is no support of the claim sometimes made that women programmers are more likely to change jobs than are men.

It should be noted that fewer women are employed in programming. This fact is sometimes pointed to with the claim that there should be about 50% employment of women in programming, and the discrepancy is attributed to discrimination against women applicants.

But there are fewer women entering the field of computer science than men.

An important factor contributing to the smaller number of women in programming is the fact that there is a smaller number of women applicants for programming positions.

Wolfe is professor of computer and information science at Brooklyn College in Brooklyn, N.Y.

Reader Commentary

puter science major at a professionally recognized institution will often need only minimal organized training or none at all. These persons with good college records in their major can generally learn well on the job and from books and manuals.

Lower Level Accepted

The company that excludes consideration of computer science majors without work experience is thereby accepting some persons of a lower level of logical capabilities than some of the applicants whom it is turning away without appropriate consideration. Computer science majors generally progress very well when they are given the opportunity.

By no means, however, should it be assumed that all new computer science graduates are recommended for employment in programming. Nineteen percent of that group did not perform sufficiently well on the test to qualify for such recommendation.

In the group of experienced programmers there were almost twice as many — 37% — whose test performance was inadequate for a positive recommendation for employment.

Because of the wide range of capabilities within any single group with a common background of experience or education, the personnel director would do well to broaden his spectrum of

change of job to another company for whatever reason and the group of new college graduates with a major in computer science, it was found that the women outscored the men.

Of the 473 job applicants who had prior experience in programming, there were 102 women and 371 men. Whereas 37% of the men scored in the superior range, 46% of women scored at that level.

In the group of computer science majors, there were 47 women and 153 men. While 46% of these men scored as superior, 57% of the women scored in that range.

There was, of course, considerable overlapping of the ratings of these two groups, although whatever differences were found were always in favor of the

Letters to the Editor

Apology Bestowed

In his letter [CW, Dec. 13], Richard D. Peters mentioned Syncom, Inc. along with four other major disk suppliers. He stated that no one could answer, to his satisfaction, questions regarding a 2316-type disk pack.

No one at Syncom recalls talking with Peters. Syncom prides itself on the ability to answer

and/or research all questions.

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Robert A. Hedler
National Sales Manager
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Must FAA System Standards Be Purchased With Blood?

By Kenniston W. Lord Jr.

Special to Computerworld

Nearly everybody who reads me is aware that I was formerly the president of the Society of Certified Data Processors (SCDP). What is not commonly known is why I resigned.

While there were ultimately many reasons, the beginning of the end for me was Dec. 7, 1975, when I picked up a newspaper in Atlanta to discover there had been a near-miss in the skies over Lake Michigan, a near-miss involving two jumbo jets and approximately 400 people.

Within a matter of days, CBS-TV's "60 Minutes" divulged that in 1975 there had been something like 3,000 near-misses. The weekly magazine *Time* further explained they were the fault of "programming errors."

At that point I sought, and was denied, the concurrence of the SCDP board of directors to seek a court injunction to force the Federal Aviation Administration (FAA) to stand the system down until sufficient testing could be done to prove beyond the shadow of a doubt that those who rode the nation's airways were safely being handled by the DP used to control the system.

So confident was I that the board would grant my request that I drove my own car to Chicago during the time period in order not to be caught by the action I would instigate. The confidence was unfounded, as it didn't grant my request. But my concern for the situation has not gone away. Stories like *Computerworld's* front-page article last Sept. 20 renew my concern.

Three Concerns

I have three concerns in dealing with the problem: (1) the standards used to construct, test and "certify" the FAA's air traffic control system; (2) the potential for someone so inclined to cause such a mid-air collision on purpose; and (3) the right of the flying public to know it is protected or to know the extent to which it is not protected.

In the Sept. 20 article, the FAA acknowledged its system "went down" 126 times by then in 1976. Countering that claim was the controllers' claim that there are "20 to 30 outages a week."

Even if we accepted as creditable even half of the minimum claim of the controllers, that's still about 360 outages, nearly three times the FAA claim.

If we theorize that there are 100 planes in the air somewhere in the system and that each plane carries 100 people, that's 3,600,000 lives in danger. And of course, if the load factor is higher and the number of flights are higher, what then? It's frightening.

By What Standards?

The FAA has stated its system has been "certified" by The Airways Facility. To begin with, most of the flying public does not know just who, or what, constitutes "The Airways Facility."

What we do know, however, is that while the FAA has claimed that the system was adequately tested, nobody knows by what standards it was tested — and we all know there is no mandatory design or testing standard covering any system, much less one which could conceivably endanger the lives of 10 million people.

The Airways Facility is not part of the National Bureau of Standards. It is not part of the American National Standards Institute. It is not part of the American Federation of Information Processing Societies. It is part of the FAA.

In other words, the system is "Safe" because the FAA says it is safe.

Clearly it's time to stop the system until it's proven to be safe. The controllers have indicated the problems shifting back and forth from the system to the old manual system. One wonders why the air traffic controllers' union hasn't struck over the issue. We know them to be a serious and concerned group of people who work under

extreme pressure. That we haven't had a mid-air mishap such as that which recently happened in Europe is a wonder.

Underlying my concerns over the potential for danger and mishap, however, is the realization that such near-misses might possibly not be "programming mistakes" at all. I cannot escape the fact that it is very possible for a programmer, so inclined, to bring together two of those planes on purpose.

Assuming that the certification done by the Airways Facility was, in fact, adequate and accurate, is it not possible that somewhere in the hundreds of thousands of lines of code there is a test for some random variable, such as an unusually high number of aircraft in a given sector on the random day of the random month? And what kind of testing could uncover that?

So it is theoretically possible that Joe Programmer, that one person in 1,000 who has a slight mental malady, is gleefully waiting

for his "fancy" subroutine to be exercised. Does that give you cause for concern?

The airline industry in this country is big business. It would not long stand for a shutdown of the system. But it should be

... And in This Corner

remembered that, at the moment, the airline industry accepts the liability for injury, liability which, it seems, belongs more rightfully with the FAA.

At the same time, it is not obvious from reading their publications that the Airline Pilots Association, the Aircraft Owners and Pilots Association and the Airline Passengers Association are taking any action to force the FAA to undergo the rigorous testing necessary to provide those guarantees.

Why, then, since a computer is the focal point of the system, should not computer people take those actions?

They cannot. One cannot criticize a system for not providing protection according to standards, for there are no standards.


Of course, there should be legally enforceable standards for construction, testing and certification of such a system. Where does it begin? It begins with you and with the organizations to which you belong.

I was not successful, for I couldn't get the resources of a thousand-person organization behind my suggested action, and that led to my resignation. But some of you readers belong to a multithousand member organization. It's up to you, if it's going to happen.

And if it does not happen, remember this: The system will remain "under test," and you may be the guinea pig. We'll eventually get those standards, but you may have purchased them with your blood.

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Running Out of File Space

Package Delays User's Purchase of Additional Disks

By Don Leavitt
Of the CW Staff

NEW YORK — Acquisition of more disk space should be the last resort — and not the automatic first reaction — of a user when an installation appears to be running out of file space, according to a systems programmer for Handy & Harman, a metal fabricating firm headquartered here.

Effective management of existing space is often the way to avoid needless acquisition, Henry J. Comegys said recently. Moving files during heavy workload periods, coping with unused or defective tracks, reorganizing files and billing for their use are problems for which additional space may be no solution, he noted.

When Comegys joined Handy & Harman more than two years ago, it was operating an IBM 360/30 and there was no file management or records. "Judgments were

largely made by the 'seat of the pants,' " he commented. "It was pretty difficult to justify decisions or possible disk acquisitions based on gut feelings."

But when the company converted to DOS/VS with a 370/135, he had an opportunity to make changes which would provide better disk and file management.

Graphic Reports

Comegys acquired Diskplay, a software package from Boole & Babbage that reports graphically the files on each disk and their condition, including such things as how much of the allocated extents have been used.

This helped him eliminate the need to go through the IBM utility, LISTVTOC, every time he needed to know if space was available for a new file. By using the reports provided, he could also tell at a glance

where he could find each data file and the location of defective tracks to ensure the operating efficiencies of his disks.

The firm's four IBM 3340 disks regularly store more than 125 files, and each can now be found in a fraction of the time it used to take through LISTVTOC, he said.

Comegys' reports provide him with pertinent information he needs, including the percentage of independent overflow in the indexed sequential files. Graphically, he produces a report regarding the relative size and relationship of each file, as well as the amount of unused or unassigned space.

By developing this and other information, Comegys has found that management has a better grasp on and control of the disk situation. "We probably save 25 man-hours a month producing reports on Vtoc files, as well as relative size and relationship of each file," he said. "We now know on a weekly

basis the exact volume of files we have in storage."

Comegys also believes these reports help the operations user check reorganizational structures before they are implemented to ensure an efficient reorganization.

"Most importantly," Comegys stated, "easy-to-use reports and sound disk management procedures permit us to monitor index sequential files to keep us from bombing out."

"The Graphic Display uses the 'strike-over' character method to indicate available file space allocated," he stated. "A glance of the areas indicates whether file reorganization should be performed prior to an updating run. An end-of-file for sequential files is noted on the sorted Vtoc listing displaying the cylinder and head locations."

Comegys feels disk management is an inexpensive method of increasing system efficiency and keeping system costs down, especially when the workload is constantly on the rise. "By properly managing our disk files, we were able to increase our active usage more than 65% during a six-month period without buying additional disk packs," he concluded. "If we hadn't had a method of knowing exactly what was in the packs and the condition of every track, we would probably have to have added four additional disk packs during that period," he noted.

"As it is, when we need the added capacity, we'll be able to easily document our additional needs," he said.

On-Line Order Modules Use NCR 8200

DAYTON, Ohio — Small to medium-sized manufacturing companies that fill customer orders from stock will be able to do the job with an NCR 8200 minicomputer and a set of interactive application modules just announced by the company, an NCR spokesman said.

The first three modules of the system — order processing/sales analysis, inventory control and planned receipts — will be available for customer delivery in the first quarter of 1977.

Modeling Meet Seeks Papers

PITTSBURGH, Pa. — The School of Engineering at the University of Pittsburgh has issued a call for papers for presentation at the Eighth Annual Pittsburgh Conference on Modeling and Simulation, scheduled for April 21-22.

Special emphasis at the conference will be on energy, social, economic and global modeling, but papers on all traditional areas of modeling and simulation will also be considered, according to the sponsors.

Two copies of titles, authors, all authors' addresses, abstracts and summaries should be submitted by Jan. 28. Abstracts should be about 50 words long while summaries "should be of sufficient length and detail to permit careful evaluation," the conference announcement said.

Notification of acceptance for presentation will be given by March 4. Further information is available from William G. Vogt or Marlin H. Mickle, 348 Benedum Engineering Hall, University of Pittsburgh, Pittsburgh, Pa. 15261.

They can be used by themselves, in conjunction with one another or with a previously released interactive general accounting system. That system includes accounts receivable, accounts payable, payroll and general ledger accounting.

The order processing/sales analysis application accepts orders entered on CRT terminals, validates the entries, processes the new data against information in the data files and prints the required documents and reports.

Among the functions of the order-processing application are one-, two- and three-cycle order processing, back-order and invoice processing, sales history, drop shipments and various order-status reports.

Sales analysis reports break out sales into various categories. These reports can show the activity of the last 13 months and a comparison of the current month's activity with the previous month's activity as well as a comparison of the current month with the same month last year.

Reports produced by the inventory control module show stock status, product replenishment requirements and product movement history. The module maintains information on current quantities on hand, on-order and back-ordered, as well as the catalog data used for product identification, the spokesman noted.

The third module, planned receipts, projects receipts and orders in a weekly summary for each product and calculates availability within a certain lead time, he added.

The interactive manufacturing control systems require a 48K Century 8200, a CRT terminal, a 9.8M-byte disk unit and matrix line printer.

The application modules are subject to an initial payment and a monthly license fee.

The initial payment for order processing/sales analysis is \$1,895; for inventory control, \$800; for accounts receivable, \$500; and for planned receipts, \$250.

Monthly license fees are \$75, \$40, \$30 and \$10 respectively.

The system also requires use of NCR's Interactive Multiprogramming Operating System (Imos) and Imos utilities, which are subject to a monthly fee of \$10.

'Our/Power' Turns 'Power/VS' Into Multi-CPU Spooling System

FORT LEE, N.J. — The Our/Power package from Oxford Software Corp. is an enhancement of IBM's Power/VS spooler that allows the user to share his spooling queue between two or more CPUs, according to an Oxford spokesman.

Use of the package provides "significant advantages" to the multiple-CPU user that range from a reduction in the size of the spool disk space needed to an increase in throughput as a result of equalization of I/O resources, he claimed.

To illustrate Our/Power's capabilities, he said the package "will not allow" a printer on one CPU to be idle while the second is loaded. In addition, the system will ensure that a job is run on the first CPU available, regardless of the one to which it was input, Oxford said.

Our/Power can eliminate hardware switching equipment dedicated solely to reader/punch/printer switching between several CPUs. Alternatively, the software could lead to elimination of extra punches

and card readers that had been used because there was no switching capability under IBM's Power, the independent added.

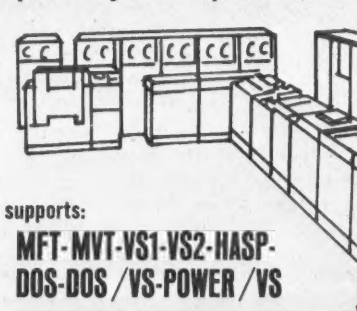
All code in the package is compatible with the Power/VS system supplied with IBM DOS/VS releases 31, 32 and 33, Oxford said, adding that Our/Power "makes no functional alteration" to the IBM software and the user may continue to run both CPUs as under normal Power/VS.

The only difference, apart from performance, is from the operator's viewpoint, the spokesman stated. Unit record devices will appear as if they are attached to both CPUs and a queue file display executed at both consoles simultaneously will produce identical results, he said.

Pricing for Our/Power is \$500/mo on a two-year lease or \$10,000 under a purchase agreement. In either case, there is a separate one-time \$500 charge for each DOS/VS release after Release 31, Oxford noted from 158 Linwood Plaza, Fort Lee, N.J. 07024.

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'Order' Runs Under Datacom

DBMS Enhanced; On-Line Application Also Available

DALLAS — Enhanced versions of the Datacom/DB and Datacom/DC data base and data communications packages are now available from Computer Information Management, Inc. (CIM).

At the same time, a sister company — Mauchly-Wood Systems Corp. — has introduced an on-line order entry system (Order) designed to run under the Datacom software.

Major features of Datacom/DB Release 6.0 include both multiuser and multiple data base facilities. With these, multiple users can work with a single reentrant copy of the data base software and any given user program may access multiple bases, CIM noted.

Improved buffering techniques are said to allow more intelligent sharing and reuse of data and index buffers, reducing I/O

requirements normally associated with data base operations, a spokesman added.

Exclusive control, which provides protection for multiple users who are updating the same data, is now maintained at the logical record level rather than the physical block level as in prior releases of Datacom/DB.

The update of Datacom/DC, Release 4.2, is said to provide enhanced IBM 3270 masking, Ascii bisynchronous support — including AT&T Dataspeed 40 terminals — a DOS/Entry version, paging for remote 3270 terminals and paging and masking support for front-end processors.

Release 4.2 also provides backup and reorganization utilities for DOS private libraries and special, enhanced support for Peripherals front-end processors, CIM added.

The Mauchly-Wood Order package sup-

ports user operations including, for example, salesmen's inquiries into an inventory data base to determine the availability of an item and clerks' entries of new orders via a CRT terminal.

Once an order is entered, the system provides background customer information and writes shipping orders, picking slips and invoices. It also charges the customer's account for items shipped, back-orders items not available, updates inventory and creates a base record for statement writing.

Mauchly-Wood expects its software to be modified — by its staff or by the user — to meet specific installation needs. The \$100,000 cost quoted for Order does not include any modification since that would vary from site to site, a spokesman added.

Datacom/DB and Datacom/DC, required for Order operations, cost \$44,000 to \$81,000 depending on features selected, CIM said.

Both firms are at 3707 Rawlins St., Dallas, Texas 75219.

Performance-Related Software, Hardware Monitors in EDP/PR

PHOENIX — The fourth annual survey of performance-related software, published in the December issue of *EDP Performance Review* (EDP/PR), includes abstracts describing more than 200 packages grouped into a dozen categories.

In compiling the list, EDP/PR editor Phillip C. Howard used the word "performance" in its broadest sense.

Howard's choice of categories was "somewhat arbitrary," he admitted, but they are understandable enough to be immediately useful.

His breakdown includes communications, compilers/precompilers, data management, job accounting, librarians, operations management/utilities, program optimizers/analyzers, simulation, software monitors, system software, translators/simulators and programming and debugging aids.

At the start of each category, the reasoning behind its inclusion is briefly spelled out.

Under "Communications," for example, Howard noted his list includes only those packages used to model and optimize communications networks, augment the operat-

ing system to reduce communications overhead or ease the burden of programmers implementing on-line applications.

In a break from listing "pure" software, he also included seven hardware monitors, justifying their inclusion on the basis that all but the simplest of these devices depend on software packages for the reduction and display of the captured data.

The total number of products described in this survey (233) is close to the 1975 total (229), but actually shows considerable turnover. Sixty-one new entries slightly more than offset the 57 products Howard dropped from last year's list — apparently because they are no longer actively marketed.

At the end of the package abstracts, Howard provides names and addresses of the 94 vendors represented, having warned that his descriptions by themselves were not meant to be complete enough for product evaluation.

EDP/PR is available by subscription for \$48/year. Individual copies cost nonsubscribers \$5 each, Howard said from his offices at Suite 298, 8808 North Central Ave., Phoenix, Ariz. 85020.

'ASC' Revision Extends Output

PRINCETON, N.J. — The Automated System Charter (ASC), formerly an option of Autoflow II, is now available as a standalone product for IBM 360/370 installations, according to its vendor, Applied Data Research, Inc. (ADR).

ASC is a tool that can be used by management, programmers, analysts and end users, ADR said. Through various high-level charts and reports, the software relates data entities to the machine processes which access, modify or produce them, a spokesman

added.

The Charter also analyzes and presents the data requirements of overall computer operations over a period of time and provides a complete picture of all the jobs, processes and data involved in each application system, he claimed.

Enhancements built into the latest release (Version 6.0) include system logic charts focusing on all conditional program execution and listings of data sets passed across job boundaries.

A special input exit is now available to permit user-written routines to interface directly with the System Charting Language (SCL) processor. This facility enables the user to examine each SCL statement prior to its execution and make whatever changes are necessary, ADR said.

ASC Version 6.0 will accept up to 25,000 input SCL statements, based on user installation-time parameterization, the spokesman added.

For OS users, the Job Control Language (JCL) Translator has been upgraded to accept all new VS keywords. This updated translator is available in a nonoverlaid form which will provide much faster processing speeds and, therefore, far greater cost effectiveness, he said.

ASC is available on a permanent license to DOS users for \$6,500 and to OS users for \$7,500, the vendor said from Route 206 Center, Princeton, N.J. 08540.

AIAA Schedules Seminars

On DOD Directives

LOS ANGELES — As a follow-up to seminars it ran last year on Department of Defense (DOD) software management directives, the Los Angeles Section of the American Institute of Aeronautics and Astronautics (AIAA) has announced plans for another series early this year.

"Software Management/Phase II-Implementation" will be presented in Washington, D.C., in late January, in Boston in mid-February and in Los Angeles in early March.

Registration fees range from \$185 to \$235 depending on the registrant's status; further information is available from AIAA-Software, Suite 1403, 444 W. Ocean Blvd., Long Beach, Calif. 90802.

VSERV SAVES DISK SPACE

A tool for identifying wasted disk space and allowing more efficient space allocation in IBM DOS or DOS/VS environments, Vserv is a "volume table of contents (Vtoc) service utility" available from Occidental Computer Systems, Inc. (OCS).

Vserv solves the disk management problems encountered in most DOS and DOS/VS installations by providing management with a comprehensive device mapping facility and Vtoc access capabilities.

Vtoc manipulation commands supported by Vserv allow the user to graphically display a pack map and create, delete, update or rename a Format-1 label for a file.

The ability to truncate one or more files to the last used track is also part of the package. These Vserv options allow management to take direct action to solve underutilized space and overallocated file problems.

Vserv is provided with a Genserv macro that

allows the user to tailor his Vserv operation to defaults and security checking. Security checking is through the UPSI or SYSPARM fields of the supervisor and provides safety against unauthorized use of the commands.

Vserv consists of a 18K program and a B transient. Vserv reads the Vtoc, sorts it in core and prints the pack map; this shows free spaces and provides a pack usage summary, displays end-of-file addresses, recognizes system files and libraries and flags data secured and expired files.

Vserv is available on a 30-day free trial. The user guide is self-generated by the Genserv macro and the system is provided on magnetic tape.

Vserv is available for a one-time purchase price of \$400. Occidental Computer Systems, Inc., 10202 Riverside Drive, No. Hollywood, Calif. 91602.

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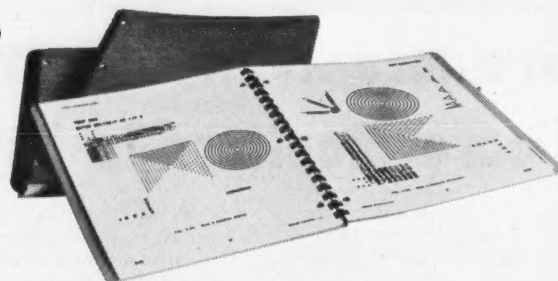


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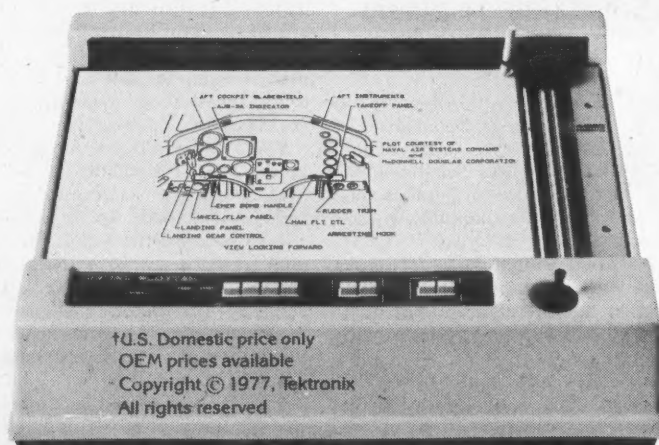


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'Packmap' Details Use of Volume

ALBANY, N.Y. — A system resource management tool, Packmap from Computer Linguistics, Inc. (CLI) allows users to get "accurate, cohesive pictures" of the dynamically changing logical structure of direct access volumes in an IBM environment, a spokesman said.

The package is said to combine the most widely used features of IBM's IEHLIST utility with a graphic reporting mode to provide an intuitive picture of full volumes as well as precisely detailed status information. This allows full volume analysis without excessive clerical work, the spokesman added.

The Packmap user can map up to 14 on-line volumes, giving graphic representation of all Extents of all data sets on each volume and the location and size of the Volume Table of Contents (Vtoc) on each volume, CLI said.

The location and size of all free space Extents on each volume and the lost space—again by volume—are also provided under Packmap, the spokesman noted.

The user may also optionally obtain a compact Vtoc listing giving all relevant data attributes about each data set on each volume, including size and number of Extents, or the same type of data on any number of single data sets, using the system catalog if desired, he continued.

Packmap currently supports IBM 3330, 3330-11, 2305, 2314, 2311, 3340 and 3350 direct access devices. As new devices are announced or users find need for others, "support can be easily incorporated into Packmap processing," he said.

The software was designed to run in 24K bytes under IBM OS and OS/VS.

Packmap source code, installation and operating instructions as well as new device support is available for a one-time fee of \$650 from CLI, 24 Aviation Road, Albany, N.Y. 12205.

With 'Jars' Update

DOS Users Get Resource Utilization Data

McLEAN, VA. — A series of system use reports now available under Version III of the DOS Job Accounting Report System (DOS/Jars) from Johnson Systems, Inc. provides users with hard-copy information about system resource utilization, according to the vendor.

The basic function of the package is expected to remain as support for documenting and, if desired, billing use of the system resources.

The graphs and reports are laid out to aid the DP manager by identifying changing

resource use trends early, maintaining satisfactory customer service levels and reducing resource contention through proper scheduling, the spokesman explained.

The new reports are similar to ones that have been available to OS/Jars users for some time, he added. They include a Computer Utilization Summary report, a series of Job/Program Activity Analysis and separate printouts showing CPU, disk and tape activity.

The summary report provides manage-

ment with a comprehensive one-page recap of overall utilization figures, plus "basic measurements" of operations performance for user-defined time intervals, the spokesman stated.

The basic data includes problem program CPU time by partition, system overhead and wait time and partition occupancy time, he added.

The Job/Program Activity Analysis identifies the work that consumes the largest percentage of each type of resource.

The Program Activity by CPU Time Used report, for example, ranks programs by total CPU time used. Other reports define activity by such things as number of times a program is used, number of disk SIOs or page faults, he continued.

The CPU Activity report clearly shows peak periods of CPU use and enables management to correlate CPU utilization, multiprogramming levels, partition occupancy and paging activity.

The more detailed reports on disk and tape use should help management anticipate problem areas so that corrective action can be taken before situations get out of hand and to monitor how effectively any defined job class structures are working, he said.

DOS/Jars is available under a permanent license agreement for \$4,000 or under a 15-month lease arrangement for \$400/mo.

An interface with IBM's Power/VS costs an additional \$1,500 or \$150/mo, the company noted from 8400 Westpark Drive, McLean, Va. 22101.

'Faces' Detects Coding Errors

ATHENS, Ga. — The Fortran Automated Code Evaluation System (Faces) from the Cosmic clearinghouse, a software support package for IBM 360/370 installations, was designed to detect coding errors and unsound coding practices in any ANS Fortran source code.

Written almost completely in Fortran—but with "1%" IBM Assembler code—Faces does not duplicate compiler error-detection capabilities; it enhances them, according to Cosmic.

The system is capable of handling individual modules or series of interrelated modules in a single pass, a spokesman added.

The software includes a driver section responsible for file manipulation and interpretation of user commands and three subsystem components. The Fortran Front End (FFE) subsystem analyzes submitted source code and builds tables which characterize module operation, he said.

Source code of the modules being analyzed is captured on a Catalog File for use in generating reports. Situations which limit processing effectiveness are recorded on a flag file, a program abstract noted.

The Automated Interrogation Routine (AIR), the second subsystem, examines the

tables created by FFE for constructions selected by the user. If it finds them, AIR posts diagnostic messages to the Flag File.

The third subsystem—a report generator—combines the contents of the Flag File with the source code in the Catalog File to document errors or problems identified by Faces, Cosmic said.

System requirements include main memory of 260K bytes and enough disk space for fixed-length files 9.6M- and 8M bytes long plus a variable length file, for which 50K bytes "should be sufficient."

Listed by Cosmic as Program Number MFS-23539/CW, Faces costs \$1,590; documentation is available separately for \$16.

Cosmic—officially the Computer Software Management and Information Center—is at Suite 112, Barrow Hall, University of Georgia, Athens, Ga. 30602.

Word Indexing System Enhanced

SAUSALITO, Calif. — The Kwindex key word indexing system from Golden Gate Systems has been enhanced to support a "wrap-around" format which prints each line with key words aligned down the center of the page, according to the vendor.

The system enables users to store documents and retrieve pertinent portions based on key words named at the time of the

request, the vendor said.

Listings show the key word either in context or out of context to one side of the document reference citation.

Written in Cobol and made up of two programs and a sort, Kwindex requires 32K bytes and costs \$825.

The vendor can be reached through P.O. Box 1736, Sausalito, Calif. 94965.



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'Locally Chaotic' Modular Code Showed No Structure

By James L. Tucker

Special to Computerworld

The example used by Stephen E. Wright in "Structured Programmers Should Build on Sections" [CW, Nov. 15] was not an example of structured code — nor even of good code of any type.

Concepts and Techniques

It was, however, modular code because it had one entry and one exit.

Modular code with its local GOs is only locally chaotic (which is better than producing globally chaotic code), but it is not structured. The example described a repetitive process and the proper and only structured representation of a repetitive process is the DO...WHILE construct which, in Cobol, is a PERFORM...UNTIL. A structured module does not implement a repetitive process with GOTOs.

(Digressing for a moment, what is the historical reason for the emphasis on the EXIT paragraph? Was it not an attempt to draw programmers back to producing modular code?)

(Well, structured code is different from modular code. The THRU option on the PERFORM and the EXIT paragraph are remnants of solutions to crimes of the past.)

In code which is supposedly structured, paragraph names are used for two reasons. One is to identify, with a descriptive name, a procedure which is PERFORMed from a higher level control module.

The other is to break the rules. Maybe under some circumstances the rule breaking is tolerable, but it is still rule breaking.

Which brings me to my next criticism of the code. Did its name GET-NEXT-TRANSACTION describe its function? No, it did not. The routine described how a transaction is processed.

The phrase GET-NEXT-TRANSACTION was identical to the phrase READ-TRANSACTION used elsewhere in the module. The phrase PROCESS-TRANSACTION is a more descriptive and, therefore, a more proper name for the module.

Next, I believe we should address the algorithm used. It is obvious that the module was intended to be part of a sequential pass of a transaction file. The algorithm used

was simply a repetition of the READ-then-PROCESS sequence.

As is widely known, the best design of a sequential pass of a file is to do an initial read in housekeeping right along with the rest of the initializations of unknowns and then repetitively execute a PROCESS-then-READ-NEXT-TRANSACTION sequence. This algorithm was first described to me in 1972 and recently published by Michael Jackson in *Principles of Program Design*.

Introducing one more condition-name to replace the literal "T," the module properly designed and structured would be:

PROCESS-TRANSACTION.

IF TRANSACTION-CODE-IS-VALID

PERFORM PRINT-TRANSACTION

ELSE

PERFORM PRINT-ERROR.

PERFORM READ-TRANSACTION.

In a higher level control module would be the statement:

PERFORM PROCESS-TRANSACTION

UNTIL NO-MORE-TRANSACTIONS.

One last point. As you probably noticed, I reversed the conditional NOT = "T." I have nothing against negated conditionals,

but I do not believe the negation should be emphasized unless, of course, its importance warrants it.

In this module, it does not have importance, and therefore should not be emphasized.

Somehow, not going to hell does not have the ring nor quite the comfort of going to heaven. . . . Oops! I used a GOTO. As we all know, the phrase is not GO TO HELL, but PERFORM DAMNATION UNTIL JUDGEMENT-DAY, which is, of course, theologically more sound — according to most Christian thought.

Interesting, isn't it?

Tucker is a computer specialist with the U.S. Army Management Engineering Training Agency, Rock Island, Ill.

Good PERFORM Use Stops Local GOTOs

By James T. Cronin

Special to Computerworld

I agree with Stephen Wright ("Structured Programmers Should Build on Sections," CW, Nov. 15); the THRU option of the PERFORM verb should be avoided. But the solution given by Wright does not go far enough in the right direction.

Rather than using meaningless paragraph names for local GOTOs, the local GOTOs should be eliminated altogether by transferring the loop control mechanism out of the performed paragraph into the PERFORM verb.

Using paragraphs and not sections, the code example would then become:

```
PERFORM GET-NEXT-TRANSACTION
UNTIL
TRANSACTION-CODE = 'T' OR
NO-MORE-TRANSACTIONS.
IF TRANSACTION-CODE = 'T'
PERFORM PRINT-TRANSACTION
(further code for valid transactions)
GET-NEXT-TRANSACTION.
PERFORM READ-TRANSACTION.
IF NO-MORE-TRANSACTIONS
NEXT SENTENCE
ELSE
IF TRANSACTION-CODE NOT EQUAL
'T'
PERFORM PRINT-ERROR.
```

Some of the benefits to this approach are:

- The control mechanism is highly visible in the PERFORM verb. The two possible conditions upon return from GET-NEXT-TRANSACTION are known without reading the code in the performed paragraph.
- GOTOs and their object paragraph names are deleted from the performed paragraph.
- No EXIT is needed.
- Evidence of good structured design is provided, showing a separation of control and processing.

Cronin is on the staff of the Tele-Computer Center at Westinghouse Electric Corp., Pittsburgh, Pa.

GNMA Securities Managed By Modified RCC Service

PALO ALTO, Calif. — Portfolio accounting for Government National Mortgage Accounting (GNMA) securities can now be handled by the Liquidity Management System (LMS) on the Remote Computing Corp. (RCC) network.

The service saves time, improves accuracy and provides more current information, an RCC spokesman claimed from 1076 East Meadow Circle, Palo Alto, Calif. 94303.

UCC Adds Fasnet Service

DALLAS — University Computing Company (UCC) has announced a communications network service to complement its local-access and in-Wats communications capabilities.

Called Fasnet, the distributed data network allows local telephone access to UCC's multiple Fasbac systems from over 6 cities throughout the U.S. and Canada.

The network headquarters are at 8303 Elmbrook Drive, Dallas, Texas 75247.

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Lear-Seigler-ADM 1-2-3	-DASI -101, DASI -102, DASI -103
MI ² Corporation	-DASI -760 (Acoustic Couplers)
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At Savings and Loan Institution

Dual-Vendor Net Changing Nature of Mortgage Banking

By John P. Hebert
Of the CW Staff

SAN FRANCISCO — A two-vendor terminal network tied to minicomputer-based files is changing the nature of the mortgage banking business at a large savings and loan institution here.

The network is helping Citizens Savings and Loan Association reduce the time required to process a mortgage loan from the usual four- to six-week wait down to a few hours, according to Vice-President Don Deitch.

Although Citizens initially sought to eliminate mainframe overhead and the headaches of processing 150 to 175 different types of loan forms, it has been working toward writing mortgage loans in an almost real-time fashion through utilization of forms-handling terminals.

Deitch credited a combination of Interdata, Inc./Perkin-Elmer Model 310 Carousel printer terminals and Datapoint Corp. CRTs and minicomputers in cutting down time, costs and mainframe overhead for Citizens' loan origination and tracking

system.

Twenty-five Carousel terminals act as slaves to 31 Datapoint 3600-II CRTs at eight regional offices serving 71 branch sites in the state, Deitch said.

All of the terminals communicate with one of two regional headquarters here through an in-house Centrex system and in Los Angeles via foreign exchange lines.

Both headquarters house a total of three Datapoint 5500 CPUs configured with Memorex 5440 disk drives accessed by the terminals over half-duplex, dial-up lines, according to Deitch.

The printers communicate with the 5500s through the 3600-II CRTs in a master/slave mode via a 1,200 bit/sec and 150 bit/sec reverse channel and Universal Data Systems, Inc. Model 202C modems, he said.

Because all characters transmitted pass through a buffer on the Carousel, the printer can operate at 30 char./sec speeds with bursts up to 45 char./sec.

A character interrupt working under a Datapoint Datashare software algorithm determines when the buffer is full and

causes the processor to stop sending, Deitch explained.

It took a concerted effort between management and the engineers to accomplish the desired communications speed. The engineers said they would "play with it for a while" and, as it turned out, it was a simple program to write.

Communications between two of the 5500 minicomputers is under the control of Datapoint's Multilink software program and Datapoint's Datapoll to execute slave polling of one another.

Much Network Activity

There is a great deal of activity on the network because Citizens services 55,000 of its own loans and has more than 300,000 savings accounts — all handled by its DP center, which has been elevated to a separate organization — Citizensystems — with Deitch as president.

Reported to be the 10th largest savings and loan association in the country with over \$2 billion in assets, Citizens experienced more problems with time losses and

the possibility of errors in handling all the necessary forms, Deitch said.

In order to process mortgage loans, Citizens had to complete all the state and federal loan approval forms by hand. Such documents, Deitch said, can be as long as 26 inches or as short as five inches and some involve multicarbon sets with individual sheets of varying lengths, he said.

"What we needed was a printer terminal that offered universal formatting and could handle single sheets of the multipart forms, in addition to a tractor-feed capability," Deitch explained.

"At the same time, the printer had to be capable of receiving data from the Datapoint 5500 CPUs at 1,200 bit/sec speeds," he added.

Citizens' looked at a number of terminals, but those units lacked either the multiple forms handling, high-speed communications capabilities or the ability to be used as an IBM Selectric-type typewriter, he noted.

Work Condensed

When transmitting or receiving, the Carousel terminal's keyboard is not used, but the terminal can be used as an off-line Selectric-type typewriter replacement, he added.

Although there has been some cost savings from the dual operational capacity of the printers, Deitch said the main advantage has been to condense the work through one source in a standard manner for all loan applications, thereby ensuring the quality of Citizens' portfolio.

"There is 15 to 20 minutes of intense inputting of data into the Carousels rather than several weeks of manual input," he said.

"The emphasis associated with the work shifting dynamically has been on increasing the number of skilled processors to input data to the terminals," Deitch explained.

Deitch declined to estimate cost savings from manpower reduction and redistribution, but indicated there were significant savings resulting from the use of the computerized system which costs \$14,000/mo.

Three Activity Levels

Deitch explained there are three levels of activity on the loan tracking system.

In the first level, data is gathered and edit checks are performed on the 3600-II. This creates an electronic filing cabinet on the 5500 systems, he said.

The loan documentation is drawn up for approval and checks are written for loans on the Carousels, Deitch said.

Management reports are made from the first level input for cash flow control and management of loans in process at the second level, he said adding the system "looks" at the entire file on the 5500s every 10 days for a dollar-lending projection.

(Continued on Page 29)

Micom Micro Backs Custom Controllers

CHATSWORTH, Calif. — A self-contained communications-oriented microcomputer which reportedly facilitates the operation of custom communications controllers has been introduced by Micom Systems, Inc.

Micom's 40 series communications processor was designed to perform user-specified network functions including data concentration, channel contention, message routing, polling control, speed and code conversion, protocol conversion and voice response.

The 40 series program is executed in non-volatile programmable read-only memory (Prom) and reportedly does not need to be reloaded.

Modular Design

The basic system is contained on a single-card central control module which includes an LED display and 10-position function switch for diagnostic test or system monitoring, Micom said.

Single-channel or multichannel configurations are available with CPU, random-access memory (RAM) buffer storage, Prom control firmware, RS-232 interfaces, voice synthesizer channel modules and optional operator's console, the firm said.

The central control module includes an 8-bit CPU with multilevel vectored interrupts and direct addressing to 32K bytes of Prom and/or RAM with 64K optional in 4K byte increments, the company said.

Options for the central control module in-

clude two universal 8-bit I/O ports or one synchronous or asynchronous line interface, the company added.

The operator's console consists of a CRT capable of displaying 1K characters and a 20-key keyboard, according to a Micom spokesman.

The processor can handle up to 30 line interfaces or voice synthesizer channel modules; it operates at rates up to 9,600 bit/sec asynchronously or 19.2 kbit/sec

Europe Gets Its First Scanner

COPENHAGEN, Denmark — A supermarket chain which operates over 100 stores throughout Denmark has installed what is reported to be the first supermarket scanning system in Europe.

The system in use at an Irma supermarket here includes seven NCR Corp. 255 modular checkout centers equipped with Universal Product Code (UPC) scanners plus an NCR 726 in-store minicomputer.

The symbol used in the Irma system is identical to the UPC Version "A" Number System 1, developed for use in the U.S. The data content and structure of the code represented by the symbol are different, however, from those used by the U.S. food industry.

Scanning is possible at the Irma supermarket because the chain sells only "house-label" merchandise and thus controls the printing of all labels and packages.

The bar-code labels used by Irma also in-

clude item prices and identification numbers which can be read by shoppers.

Additional features include an auto-restart timer and redundant common logic and power supplies; the voice synthesizer produces male or female speech and operates from digital vocabularies stored in Prom or RAM, Micom noted.

Prices for the 40 series communications processor start at \$1,800, Micom said from 9551 Irondale Ave., Chatsworth, Calif. 91311.



Irma checker scans 'house-label' goods.

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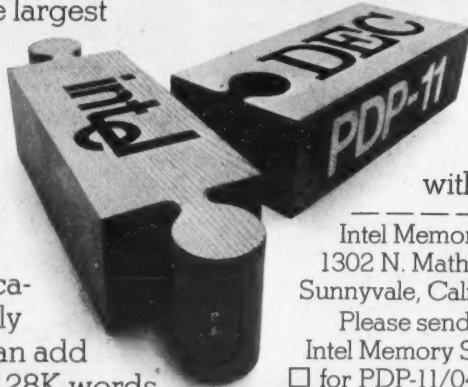
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ICC Adds Plug-Compatible CRT Series

MIAMI — International Communications Corp. (ICC) has introduced the System 400 series of interactive CRT terminals as replacements for some Honeywell, IBM and Univac units.

The 400 line of terminals can operate synchronously over dial-up or dedicated networks at speeds up to 9,600 bit/sec. The terminals are compatible with Honeywell 7700 VIP, Univac Uniscope and IBM 2265 and 3275 terminal protocols, ICC said.

The System 400 includes random-access memory (RAM) buffered communications, allowing data to be printed while an operator enters data on the screen.

Terminals in the 400 line also feature a combination of operational and display characteristics that include dual-density dis-

play, upper and lower-case character sets, user-defined program function keys and a line monitor mode for system troubleshooting, he said.

The modular terminal systems have keyboards with 32 function keys, displays and control units; they come with either 960- or 1,920-character screen capabilities.

Removable typewriter-style keyboards have audible key clicks, audible alarms and LED status indicators, ICC said.

The plug-compatible terminal replacements range in price from \$4,550 to \$5,750 depending upon the protocol desired, the spokesman said, adding lease prices range from \$120- to \$150/mo.

ICC is located at 8600 N.W. 41 St., Miami, Fla. 33166.



ICC System 400

Unit Tests Gear

STAMFORD, Conn. — The PG-303A from Dataproducts Corp. is a digital test set designed to generate test patterns to evaluate terminal and transmission facilities and equipment.

The test pattern generator reportedly provides five- and eight-level "Fox" messages, a 511-bit pseudo-random pattern and pushbutton programmable character sequence.

Standard equipment features on the PG-303A include switch-selectable data rates up to 9,600 bit/sec, asynchronous and synchronous operation.

The pattern generator costs \$1,970 from the firm at 17 Amelia Place, Stamford, Conn. 06902.

Net Changes Mortgage Banking By Cutting Time to Write Loans

(Continued from Page 27)

On the third level the mortgage banking department can select loans in Citizens' 5500 "filing cabinet" by polling the CRTs under Datapoint's Datapoll slave mode for certain loan parameters. It also allows management to select loans to be sold at the most profitable level, of percentage yield, Deitch said.

These loans are grouped by the system into various categories by contract number by the Citizens' mortgage banking group, he added.

Because the on-line system's function is crucial and "minicomputers roll over and stick out their tongues after a while," Citizens' data bases in the two regional headquarters can dial each other if one fails, Deitch said.

Built-in redundancy was demanded dur-

ing the system design, he added.

In the next three to six months, Citizens will enlarge its communications system to tie into General Automation Spec 16 CPUs acting as front-end processors to dual IBM 360s in Burlingame, Calif., he said.

The development of a switching network based on the 360s will achieve the Citizens' long-term goal of integrating the two regional loan-tracking networks and tying them into the Burlingame CPUs.

In addition, Citizensystems will extend the system to include automatic funding and booking of loans to allow mortgage loan processing in 1.5 hours from start to finish after obtaining real-estate appraisals and mortgagee credit reports, he said.

The company plans to market the system to other savings and loan institutions next spring, Deitch said.

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ADDs CONSUL 980B

Megadata Designs Two Systems For Programming, News Sites

BOHEMIA, N.Y. — Megadata Computer and Communications Corp. has introduced a programming terminal system to aid in writing applications for other Megadata terminals and an intelligent terminal intended for newswire service environments.

The UPS-7 is a stand-alone system consisting of a Model 700S data terminal with full Ascii keyboard, control keys and function keys for text editing; floppy disks with 250K characters of storage or 6.5M-byte hard disks; and a 60- or 110 char./sec printer, according to a Megadata spokesman.

The system's software permits the user to write application programs of up to 64K words via the 700S CRT keyboard and keyboard monitor, he said, adding documented program listings are made on the printer.

Communications modes are asynchronous, synchronous or bisynchronous through RS-232 interfaces, he said.

The UPS-7's programming features include a terminal editor, command interpreter, interactive debugger and Megadata Assembly Language. In addition, the UPS-7 can be supplied with an optional feature called Trix that is said to permit the user to design the shape of each character displayed on the CRT screen.

The Trix software permits the development of multilingual systems, unique fonts for typesetting and editing applications and

special graphic symbols for telemetry and process control applications, the spokesman claimed.

Megadata's UPS-7 system is available in different configurations. The basic system with 250K-character floppy disk drive and 60 char./sec printer is priced at \$14,500.

Terminal Transactions

The Trix software feature costs an additional \$600 for any UPS-7 configuration.

The 700/NW is an intelligent terminal with a 12-bit CPU that allows newsroom story composition, text editing and message switching and other communications

capabilities, according to the spokesman.

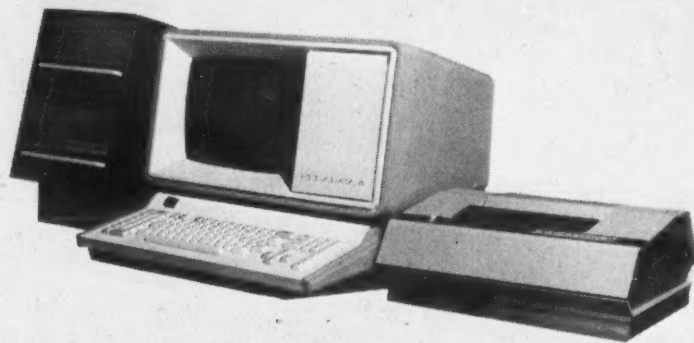
It utilizes a 23 by 15 dot character overlay matrix for high resolution of displayed text, operates only with other Megadata terminals and is available in either master or slave versions, he added.

The system can simultaneously interface more than one data link while operating at different data rates from 52.4- to 9,600

bit/sec and in different transmission codes including Baudot, BCD, synchronous and asynchronous Ascii and Ebedic, he said.

A basic 700/NW master station costs \$4,500, although prices range to \$7,200.

The 700/NW slave is priced \$200 to \$300 lower than the master terminal, he said from 36 Orville Drive, Bohemia, N.Y. 11716.



Megadata UPS-7

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Here's why Digital's PDP-11/70 is the fastest selling supermini in the world.

In the short time that the PDP-11/70 has been offered, Digital has shipped over 1,000 of them. Customer applications include everything from laboratory research and education to extensive communications and commercial transaction processing.

What makes the 11/70 so popular? There are almost as many reasons as there are users. In conversations with a wide range of customers, four major reasons are repeated time and again: throughput, reliability, software and Digital itself.

"We went to PDP-11s initially because no other systems offered the price/performance. User response was so enthusiastic that we added more terminals and expanded to the 11/70. Our users love it. Reliability has been exceptional..." D.H. Casagrande, Manager, Corporate Systems, ATCO Industries, Ltd.

The 11/70 is a very powerful computer, designed throughout to handle more data far faster than machines costing 5 times as much. It's supported by an outstanding selection of software. And since it's made by Digital, you can expect the highest quality, reliability and support services.

"We have a highly challenging mix of computing requirements. The 11/70 has come through with flying colors..." Loren Gilmore, Corporate Manager of Engineering and Process Control Systems, International Harvester Company.

If you're wrestling with a mixed bag of computer needs, the PDP-11/70's your machine. It has an impressive variety of operating systems, languages, data management facilities and applications packages. It can handle real-time, timesharing and batch in any combination at the same time.

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The PDP-11/70 comes with a choice of three major operating systems — IAS, RSTS/E and RSX-11 — that fit just about any operating requirements. Several languages, like COBOL, FORTRAN, BASIC, APL, DIBOL and RPG-II. And various data management systems, including multi-key ISAM and the only CODASYL-compatible Data Base Management System available in its class.

"There were only two companies that had the communications capabilities we wanted. On all counts the 11/70 was superior..." Royle Vagle, Director of Data Processing, Cooperating School Districts of the St. Louis Suburban Area, Inc.

Digital is ahead of everyone in the area of data communication capabilities. There's the DECnet software that lets you communicate with a broad range of Digital computers, from micros to maxis, and a wide range of interfaces, terminals and services.

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Up-time, in fact, was one of the major goals in the 11/70's design. It started with the selection of the most reliable components tested under worst-case conditions. And culminated in a system where operations are continuously monitored by hardware or software. If you do have a problem, the 11/70 diagnostics and packaging make it one of the most quickly serviceable computers on the market.

"Digital had the system, the software, and the support. Their commitment has been solid from the outset..." Gary Bernstein, Manager, Computing Systems, Biomedical Engineering Unit, McGill University.

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For more information on Digital's PDP-11/70 call your local Digital representative. Or send the accompanying coupon.

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IDS Extends Minitest Line

PROVIDENCE, R.I. — International Data Sciences, Inc. (IDS) has added the Model 70 current interface breakout panel and Model 60 interface monitor to its Minitest product line.

The Model 70 is a battery-powered, hand-held instrument designed to monitor and break out a Bell 303-type current interface between a modem and a terminal, the company said.

Plugging the interface cable from a standard connector into the device reportedly allows access to all 14 signal conductors as specified for the Bell 303 high-speed coaxial connector.

The current conductors are monitored by series current sensors which drive LED indicators; two EIA RS-232 signals are monitored by high-impedance, voltage-sensing circuits and the LEDs, according to a company spokesman.

Fourteen switches allow all interface signals to be interrupted for testing and

monitoring; and pins next to each switch allow miniature jumper cables to be used for cross-patching of signals, he said.

A pulse trap is included to sense spurious transitions and can be converted into an errored second indicator to provide one flash of an LED and one TTL output pulse for each errored second, he said.

The Model 70 with carrying case costs \$990.

The Model 60 EIA interface monitor and breakout panel is a portable test set allowing access to all 25 conductors of an RS-232 modem or terminal interface, IDS said.

Twenty-four switches allow virtually all interface conductors to be individually interrupted.

The self-contained, battery-powered device is priced at \$185 from IDS at 100 Nashua St., Providence, R.I. 02904.

Informer Desktop CRT Allows Direct, Remote Work With Mini

LOS ANGELES — The Model D-301 desktop CRT/keyboard terminal from Informer, Inc. was designed to allow its operators to communicate directly with a computer.

Intended for IBM 3740-type applications, the data entry terminal works directly with a minicomputer or can be connected to tele-

specified standard activities to eliminate repetitive data entry, he said.

The CRT screen is located on a stand above the keyboard and can be rotated 180°. A lock and key prevent unauthorized use of the terminal.

The D-301's 5-1/2-in. diagonal screen displays up to 512 characters in 16 lines

Terminal Transactions

phone lines for remote entry or dial-up applications, according to an Informer spokesman.

Each terminal provides standard keyboard spacing and configuration along with a separate 10-key numerical pad and function keys that can be programmed for

with 32 char./line. It uses a standard RS-232 interface and operates at any rate from 110- to 9,600 bit/sec in full-duplex mode, the spokesman said.

Informer's 10-lb. D-301 is priced at \$1,890, he added from 8332 Osage Ave., Los Angeles, Calif. 90045.

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Research Adds 3841 To Teleray Displays

MINNEAPOLIS — Research, Inc. has added the Teleray 3841 to its 3000 series of CRT terminals.

Standard features on the 3841 include wide or narrow character display, RS-232 and current-loop interfaces and upper- and lower-case Ascii character display, the company said.

All interface codes and 15 transmission speeds from 50- to 9,600 bit/sec are switch-selectable, Research said.

The unit operates in scroll or page mode and reportedly offers erase to end-of-line, end-of-page and page erase capabilities.

Cursor Control

The cursor is controlled from the keyboard or host CPU, Research claimed, adding X-Y addressing is accomplished by similar sequences. In this mode, a series of four characters moves the cursor anywhere on the 80-character density, 24-line-capacity CRT screen, according to the firm.

Options for the CRT terminal include column tab, video output, peripheral interface, numeric keypad, larger CRT and upper-case-only character set, a spokesman noted.

The terminal costs \$1,450 or \$65/mo on a one-year lease and maintenance is an additional \$156/year or \$13/mo, the company said from Box 24064, Minneapolis, Minn. 55424.

Systems Associates Offers Calcomp Plotter Interface

TROY, Mich. — System Associates, Inc. has an RS-232 interface for California Computer Products, Inc. (Calcomp) 500 series plotters.

The interface reportedly permits plotters to be located at a remote site and communicate with the CPU at speeds up to 4,800 bit/sec.

A self-contained power supply, 25-pin connection for modem control and cable connections are supplied for the plotters, a spokesman added.

The Calcomp plotter interface costs \$1,145, System Associates said from 55 Park St., Troy, Mich. 48064.

Gandalf Has Link Converter

WHEELING, Ill. — Gandalf Data, Inc. has a CCITT V-35 interface converter for user sites with high-speed transmission requirements.

The interface converter is said to be compatible with Gandalf's line of synchronous data sets and is capable of handling 100 kbit/sec transmissions.

The converter costs \$250 from Gandalf at 190 Shepard Ave., Wheeling, Ill. 60090.

Bits & Pieces

Image Display System Bows

PASADENA, Calif. — A full-color image display system which reportedly offers continuously refreshed presentation of data has been introduced by Comtal Corp.

The unit was designed to operate either on-line to a host processor, such as a 16-bit minicomputer, or off-line with a magnetic tape drive, according to a spokesman.

The Model 2000 computer output memory and display buffer produces images that are refreshed 30 times per second and may be photographed for permanent storage, the spokesman said.

An input subsystem includes either a controller for the minicomputer or a 9-track industry-compatible magnetic tape drive and controller, he stated.

Suited for animation production applications, the Model 2000 is available with an option which automatically updates an animation camera whenever a new image is received.

The Model 2000 costs \$19,950 with tape drive option, the spokesman added from 169 N. Halstead St., Pasadena, Calif. 91107.

RDS Adds Apollo RAM Option

NORWOOD, Mass. — Raytheon Data Systems (RDS) has introduced a random access memory (RAM) capability for its Apollo array processing system.

The RAM option provides the ability to write custom microcode for the system's array processor, eliminating the need for creating new programmable read-only memory when changing algorithms.

The memory features 200 nsec storage and interim arrays for speeding computation in most algorithms. It also includes an automatic memory increment capability.

The first 3K word of memory cost \$8,500 or \$315/mo on a one-year lease. Additional 1K-word modules are priced at \$2,200 or \$85/mo on lease.

RDS is located at 1415 Boston-Providence Tpke., Norwood, Mass. 02062.

Ampex Unveils OEM Tape Drive

REDWOOD CITY, Calif. — Ampex Corp. has an OEM medium-speed tape drive for small systems.

The TME drive can operate at speeds from 12.5 to 75 in./sec and uses vacuum column tape buffering, the firm said.

The drive can accommodate standard 10.5-in. and 8.5-in. reels or minireels, Ampex stated. Transfer rate is 20K byte/sec to 120K byte/sec with a maximum 3-min rewind time, the firm indicated.

The unit costs \$4,000 for the 45 in./sec units which are available immediately and \$4,200 for the 75 in./sec unit which will be available in OEM quantities in the spring.

Ampex is at 401 Broadway, Redwood City, Calif. 94063.

To Serve 'Every Phase'

Former 370/135 User Gets First 138

IRVINE, Calif. — Berteia Corp., manufacturer of hydraulic flight control systems used in commercial airliners, is the first company to install an IBM 370/138, replacing an IBM 370/135.

Berteia's hydraulic flight control systems convert a pilot's pressures of about 10 pounds on the "stick" and other controls into the half million pounds of pressure necessary to turn a giant airliner in flight, according to Robert C. Langford, president.

These systems function much the same way power steering helps a motorist, he explained.

"The computer will serve every phase of our business, from conducting 'tests' on flight control systems before they're actually built to directing the machinery that makes the flight control systems," Langford said.

Berteia's flight control systems are used on the Boeing 747, McDonnell Douglas DC-10, Lockheed L-1011, the space shuttle and numerous other civil and military airplanes and helicopters.

Although airliners operate for several years, many major components are re-

placed periodically, including the flight control systems, according to Langford. Berteia manufactures both original and replacement systems for jet airliners.

The 370/138 is used to construct and test mathematical models of new or modified designs for flight systems, to determine whether a conceived design will perform up to expectation, Langford said.

Based upon computer analysis and simulation, the designs can be altered as necessary to reduce weight, improve efficiency and assure maximum safety, he noted.

The computer is also used to analyze safety procedures at Berteia to ensure that inspections in the manufacturing and assembly are proper and thorough, Langford continued.

In manufacturing, the system controls tools that make the parts in Berteia's flight systems. "The tolerances of these assembly parts are too precise for manual control," he explained.

The 370/138 also handles inventory control — a critical matter for the commercial airlines, he emphasized.

"When it becomes time to replace a flight control system or some parts on an airplane, the airlines can't be kept waiting while we try to get a new system to them," Langford said. "The system must be available and ready for installation the moment it is needed," he added.

Four-Phase Systems Introduces Stand-Alone Processing Units

CUPERTINO, Calif. — Two stand-alone processing terminals have been added to the line of distributed processing systems from Four-Phase Systems, Inc. here.

Intended for use at network locations where only one or two video displays are needed, the System IV/30 and System IV/55 provide remote data entry, inquiry and custom processing capability while maintaining software and communications compatibility with Four-Phase's larger clustered display systems, according to a spokesman.

The disk-based System IV/30 supports Data IV/70 Version 1 data entry software with batch communications to a central mainframe or other Four-Phase system. It accommodates either a keypunch- or typewriter-style keyboard for source data entry on a 1,920-char. screen, the spokesman stated.

Six program levels per job and six accumulators are provided for real-time data editing and validation with previous entries and constants. Automatic field generation enables entries such as price/quantity totals, discounts and taxes to be computed directly from existing data. Table comparisons of alphanumeric values may also be made, he said.

System IV/55 provides on-line data entry and retrieval capability with a host mainframe using IBM 3270 communications protocol, according to the spokesman. Data is displayed on a 1,920-char. screen with dual intensity and audible alarm. Four keyboard styles are available, all with 85 keys.

System IV/55 supports all 3270 operating characteristics and display commands, enabling the full range of 3270 applications software to be used, he said.

Monthly rental for System IV/30 is \$385 on a one-year lease. This includes a 24K-byte LSI processor with 1,920-char. display, integrated 2.5M-byte cartridge disk drive

and IBM 2780/3780-compatible communications. An additional display may be added for \$51/mo.

Monthly rental for System IV/55 is \$260 on a one-year lease. This includes a 24K-byte LSI processor with 1920-character dual-intensity display, integrated 354K-byte diskette drive and IBM 3270-compatible communications. An additional display may also be added for \$51/mo.

Four-Phase is at 19333 Valco Parkway, Cupertino, Calif. 95014.

IBM Continues to Experiment With Power-Switching Device

SAN JOSE, Calif. — As the price of natural energy resources becomes increasingly expensive, IBM continues to experiment with a remote power-switching device at its Product Assurance Laboratory here.

The experimental device could save users money on certain types of leased equipment — and conserve some of the nation's electrical energy at the same time — but the corporation still refuses to speculate whether it will ever manufacture or market it [CW, June 21].

The Remote I/O Power Control Station is basically an electromechanical device that, according to IBM, is simple to install and equally straightforward to operate.

The station reportedly permits the operator of IBM or any other computer systems, to manually and selectively supply or cut off power to a peripheral device, according to IBM spokesmen.

In computer systems the CPU is the source of power control signals. These sequencing signals are rerouted to the

power switching device, thus making the automatic powering process a manual one.

The energy consumption dropped about 100 kilowatt hours in the lab here in an eight-hour shift from utilizing the device to selectively power-off peripherals such as tape drives, card punches and card readers, IBM said last June.

IBM declined to elaborate any further on its use of the device, on the system configuration here on which the station is being implemented or on whether users would be able to purchase it from IBM in the future.

However, a spokesman said the project status of the energy-saving product had not changed and that it is still being used in the test laboratory here.

The spokesman would not comment or "speculate" whether IBM was keeping the device from users because of possible effects of lowering IBM's Monthly Availability Charge plan, which gives users a 178-hour/mo maximum on certain peripheral use before requiring an additional charge for utilization beyond that limit.

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Ohio Stores Solve POS Problem By Using Backup Power System

By Esther Surden
Of the CW Staff

COLUMBUS, Ohio — What does a store do when the power goes down and there's no way to get the customers through the computerized registers?

"In the old days, the old NCRs used to have a crank and you could crank the customer through," William Grether recalled. With the newer point-of-sale (POS) systems, however, there's "no way to get the customer out of the checkout lane," the director of construction engineering at Big Bear Stores Co. here said.

To deal with this problem, Big Bear equipped 15 of its stores with AC Computer-Controlled Emergency Standby Systems from Standby Systems, Inc. of Medford, Mass. The systems have been in operation at Big Bear stores for almost

three years, he said.

"When we have an interruption of power, the system allows us to automatically switch to the Standby" which provides the necessary current, Grether explained.

The system, which is based on three proprietary minicomputers on a board, controls battery voltage, charging voltage and inputs. It is only used in an emergency.

"The stores don't have too many brownouts or blackouts necessitating the use of the power backup, but more are anticipated in the future," he noted.

Big Bear chose the type of backup over traditional generators for a variety of reasons, Grether said. The system is located inside a store, allowing the store manager to become acquainted with it and its function. It is not an unwieldy generator sitting outside.

It operates cleanly and there is no maintenance work to be done on it except the occasional checking of the electrolytes in the battery, he added.

The system was easily installed, Grether said, noting not every register in every store is backed up by it. "Only about half the registers are needed," he said, adding each store has five or six registers on the system at about \$1,000 each.

"We hook up the lights over the checkout and the public address" to the system in order to get the customer "out of the store" efficiently, Grether said.

Modular Maintenance Featured in Memory For Univac Systems

IRVINE, Calif. — The Model T-7005 from Telefile Computer Products, Inc. is a multimodular core memory for Univac systems, according to its vendor.

The plug-compatible memory can be used with Univac 494, 1106, 1108 and 1110 systems in either single- or multiprocessor configurations, Telefile said.

Minimum storage cabinet capacity is 65K words of 40-bit memory; memory can be expanded in 32K-word increments with the addition of multiple cabinets, the firm noted.

The cabinets must be located within a 10-ft radius of the rear of the CPU, it added.

Occupying about one-third the floor space of the equivalent Univac memory, the memory features modular maintenance, Telefile claimed. Modules have LED indicators to detect memory errors.

Access to the memory may be interleaved between 32K-word increments, according to the company. This effectively doubles the speed of memory operation, it stated.

Standard memory cycle time is 750 nsec, but it can be optionally set at 875 nsec, 1,000 nsec and 1,500 nsec to match a user's system.

A switch allows power to be changed between 208V and 230V of input.

A 65K-byte memory costs \$59,500, Telefile said from 17131 Daimler St., Irvine, Calif. 92714.

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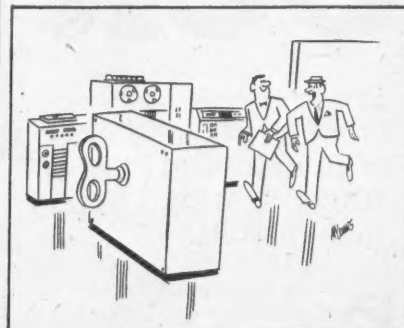
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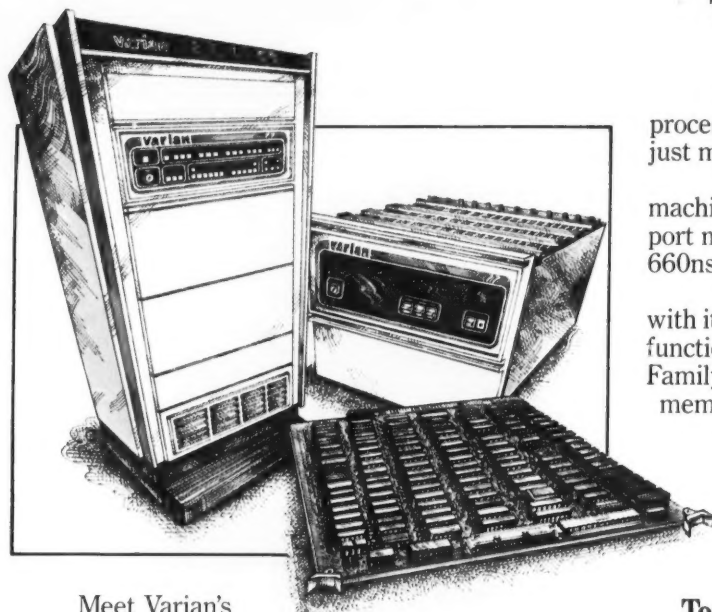
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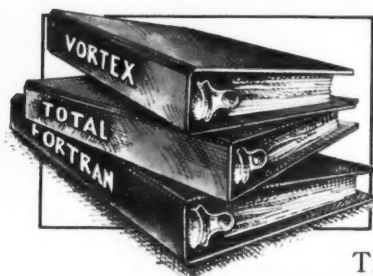
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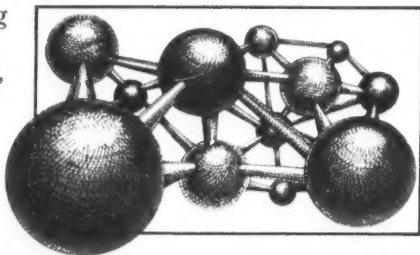
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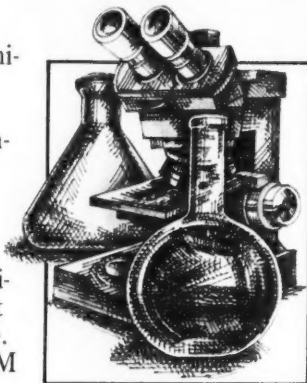
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Memory interface to V77-400

Optional Features:

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660ns MOS memory boards
(8K, 16K, or 32K word modules)
Power fail detect & data save
Modular high-capacity power supplies
System chassis



V77-400 Standard Features:

Fully microprogrammed architecture
CPU with 8 operational registers
A 32-bit arithmetic capability
Hardware multiply/divide
Direct memory access
Programmed I/O
Real-time clock
Teletype/CRT controller
Virtual console logic
Automatic program loader
Power fail detect
Memory protect
Memory parity logic
Dual port memory system

Optional Features:

Operator's console
660ns MOS memory boards
(8K, 16K, or 32K word modules)
MEGAMAP
Writable control store
Data save
Modular high-capacity power supplies
System chassis
Memory interface to V77-600
Memory interface to V77-200

V77-600 Standard Features:

Fully microprogrammed architecture
CPU with 8 operational registers
A 32-bit arithmetic capability
Hardware multiply/divide
Direct memory access
Programmed I/O
Real-time clock
Teletype/CRT controller
Programmer's console
Automatic program loaders
Dual memory buses
Power fail detect
Memory protect

Optional Features:

660ns MOS memory boards
(16K, 32K, or 64K word modules)
MEGAMAP
Writable control store
Cache memory
Floating point processor
Data Save
Priority memory access
Modular high-capacity power supply
Memory parity
Memory interface to V77-400

Library System Trims Time, Money From Arco Tape Budget

LOS ANGELES — California Computer Products, Inc.'s (Calcomp) Automated Tape Library (ATL) has eliminated 20 man-hours of job-staging time while mounting and retrieving some 1,000 tapes per day at Atlantic Richfield Co.'s (Arco) data center here, the user said.

Computer operations costs have been reduced approximately \$5,000 per month, despite expansion of the data center's file accounting system from 8,500 reels of tape two years ago to 11,000 reels today, the firm added.

Also credited to the ATL were "intangible savings" such as elimination of environmental contamination and security against scattered, missing or misplaced reels.

The ATL system is used to process Arco's marketing, manufacturing and financial applications systems, in addition to systems maintenance and development.

Efficiency improvement at the data center was attributed to ATL in three major operations: instant on-line update, off-site "disaster" storage and job entry.

On-Line Update

Operating on-line with an IBM 370/168 computer, the ATL permits updating as a file is created.

Previous manual entry, subject to human error, not only was less accurate, but also reflected file status at only one particular time — 8 o'clock in the morning, for example. Immediate on-line update keeps file status up-to-the-minute and available for reference via CRT in the scheduling area, according to an Arco spokesman.

Off-Site Storage

Of the 11,000 tapes constituting Arco's file accounting system, approximately 10% of the tapes are kept in an off-site disaster recovery storage location, established to facilitate processing recovery in the event of a disaster. Approximately 160 tapes are rotated to and from this site daily under the control of ATL software.

Software for ATL tape rotation commands was designed by Calcomp in accordance with predetermined prerequisites for maintaining a library of original tapes and backup duplicates for use in the event of fire, earthquake and other catastrophes.

ATL "knows" the slot assignment of every tape and can retrieve any tape stored

in the tape library and mount it on one of the system's 18 tape drives. The location of tapes outside of the ATL are identified and controlled for manual retrieval.

Communication and paperwork bottlenecks have been removed from remote job operations, the spokesman said. The ATL has eliminated job staging — tape set-up time — formerly requiring 15 minutes per job.

In many cases, a remote job can now be entered and completed in less time than was formerly required to stage it, he added. Approximately 3,000 remote jobs requiring tapes are processed monthly.

In-house job entry set-up time has also been reduced with the ATL system by reducing manual tape retrieval and filing operations by librarian personnel and associated manual recordkeeping.

Mark Reader Allows On-Line Data Editing

NEWTOWN, Pa. — An optical mark reader said to combine the editing power of a computer with the economy of automatic data entry has been announced by Optical Scanning Corp. (OSC).

The Opscan 12/270 features on-line computer data editing and control of document selection and data retransmission functions, OSC said.

The scanner can read intermixed source documents of variable sizes, formats and marking densities, the firm said.

Interfaces to Asynchronous Units

Interfacing to any asynchronous minicomputer, microprocessor or CPU via modular software, the 12/270 is suited to distributed or remote data entry, a spokesman added.

An Intel 8080 microprocessor implements the communications protocol, and transmission is asynchronous, serial or RS-232C-compatible. Ascii is standard, but code-set conversions are available.

The scanner can read in discriminate or uncontrolled recognition modes, and an automatic feed option provides throughput speeds of 300- to 3,000 sheet/hour.

The Opscan 12/270 costs \$250/mo on a three-year lease, according to the firm at P.O. Box 40, Newtown, Pa. 18940.

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Processes Orders Overnight

Kawasaki Increases Services With Data Entry Network

SANTA ANA, Calif. — A nationwide data communications network of key-to-disk data entry systems is helping Kawasaki Motor Corp. process orders for vehicles and replacement parts overnight.

"We wanted to increase our service to consumers by improving our service to our dealers. That's why we decided about four years ago to establish regional distribution centers," according to Douglas R. Anderson, financial vice-president.

The centers stock Kawasaki motorcycles, Jet Skis and snowmobiles as well as replacement parts for all three kinds of vehicles. Before the centers were established, dealers throughout North America mailed their vehicle and replacement parts orders directly here.

Those orders were keypunched on IBM Model 129 machines prior to processing on Kawasaki's computer system, Anderson said. After processing, all orders were filled from here.

Kawasaki saved an average of a day-and-a-half in turnaround time on orders just by establishing the regional centers, Anderson said.

Currently, dealers submit their orders via mail and phone to the nearest regional distribution center. That center can usually supply the required vehicle or part, either from its own stock or from a nearby public warehouse leased by Kawasaki, he explained.



Vehicle and replacement parts orders are keyed onto disks from keystations at each of Kawasaki Motor Corp.'s regional centers.

When Kawasaki first adopted the regional distribution concept, the firm installed Mohawk Data Systems key-to-tape equipment at each center, according to Anderson.

At that time, three centers were in operation, located in Dallas, Atlanta and Avenel, N.J. The Avenel office has since been relocated to Edison, N.J., he noted.

Dealers in other areas still mailed their orders directly here, waiting an average of two to three days for the order to reach headquarters and an equal time or longer to receive the needed vehicle or part once shipment had been made.

About three years ago, Kawasaki decided to replace its Mohawk equipment as well as its eight IBM Model 129 keypunch machines with Inforex Corp. 1300 series key-to-disk data entry systems, Anderson said. At headquarters, Kawasaki installed a Model 1303 with eight keystations and a Model 1301 with a single keystation.

Inforex Model 1303 systems were installed in some regional distribution centers and Model 1301 systems in others, with the number of keystations on each system distributed in accordance with order entry volume requirements, he said.

The Canadian affiliate, Kawasaki Motors Canada, located near Toronto, has a 1303 with five keystations; the Atlanta center has three keystations and the remaining centers have two keystations each. Those centers are located in Gering, Neb., Lincoln, Neb., and Montreal.

Anderson said Kawasaki decided to replace the combination Mohawk and IBM system with Inforex equipment, "because Inforex could give us more capability at a lower cost. Their ability to compress data, at that time, was better than that of any other vendor, and that is important to reduce data transmission time.

Anderson explained that two Inforex systems were installed at headquarters, at first, so that one could provide backup for the other in case of failures.

"But the reliability of the Inforex equipment has been such that we've found we don't really need that backup," Anderson continued, explaining that the 1303 system here is being modified to communicate with three centers — Toronto, Montreal and Gering, Neb. — using bisynchronous protocol via dial-up lines.

That modification will allow Kawasaki's Canadian offices to communicate directly with an IBM 370/145 here from an Inforex 1303, with the 1303 in Toronto emulating an IBM 3780 remote job entry terminal, he explained. The remaining centers will be linked to the 1301, communicating via Inforex' own protocol, Infosync, on a leased line.

Eventually all will be converted to bisynchronous and all communications will be handled by IBM Customer Information Control System (CICS) on the 145. At the same time, distributing input from all of the centers between the two Inforex systems at headquarters allows Kawasaki to further streamline its order entry scheduling.

"The basic elements of each Inforex system are a central processor, disk drive, tape drive and printer," Anderson said.

"Keystation operators at each regional center enter orders for both vehicles and parts as well as inventory receipts, returns, adjustments and other recordkeeping documents.

"That information comes in from dealers either by mail or by phone, although order clerks fill out order forms in the case of telephone orders. The forms are batched by document type and keyed during the day, as they are received."

At the end of each day, the data which has been keyed onto the Inforex system disk is transferred to tape at each regional center, he said.

"One major advantage to the system is that we can call up each center on a scheduled basis and pull data from each tape with the remote systems unattended," Anderson noted.



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Mini Bits

HP Cuts Prices for Memory On 21MX, K Series Systems

PALO ALTO, Calif. — Hewlett-Packard Co. (HP) has reduced prices on memory for its 21MX systems and K series of systems on a board.

The cost of 32K bytes of parity semiconductor memory for a 21MX is now \$1,500 compared with \$3,000 previously, a spokesman said.

The price of a 21MX system with 64K bytes is now \$8,900 instead of \$10,000.

The board-level K series has also been cut in price. A 16K version which cost \$4,175 previously is now priced at \$3,575.

The reductions were said to result from "economies of scale and improvements in parts costs." The memory boards can be purchased as add-on memory for existing systems or with newly acquired units, HP said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

Emerson Unit Interfaces Tape Pac System, PDP-11

SANTA ANA, Calif. — The Emerson Electric Co. Series 2000 Tape Pac system can now be interfaced to a Digital Equipment Corp. PDP-11 minicomputer, the firm said.

With the 2061 interface adapter, the unit is plug-to-plug compatible with the PDP-11, Emerson claimed. The adapter is contained on two modules mounted in a single-system unit connector block installed in the PDP-11.

The 2061 connects to the mini via the standard DEC M920 Unibus jumper module and needs only existing DEC software, Emerson said.

The 2061 interface adapter costs \$1,500 from Emerson at 3300 S. Standard St., Santa Ana, Calif. 92702.

BST Adds 3741-Type Unit

SANTA ANA, Calif. — Business Systems Technology, Inc. (BST) has a diskette entry/output device for IBM 3/6 through 3/15 systems.

The BST/41 is said to read 3,000 records and write 2,000 records per minute.

The control panel and diskette unit are located on the IBM 3 console table. The electronics cabinet, with optional second diskette, mounts below the console table adjacent to the left electronic enclosure.

The 3741-type device works with any IBM 3 using existing IBM software, BST claimed.

The BST/41 accommodates data entry/output only via IBM-compatible formatter 3741/3742 diskettes, BST noted. It costs \$250/mo on a three-year lease, the firm said from 3015 Daimler St., Santa Ana, Calif. 92705.

Boise Does Its Homework in Mini Hunt

By Esther Surden
Of the CW Staff

BOISE, Idaho — When this city decided to consider minicomputers for its municipal DP requirements, it followed a thorough pattern of research, according to a report called "Minicomputers: An Alternative Approach to Municipal Information Systems."

Prepared by Bill De Groff, Larry Blanchard and Mike Bliss, researchers for the Boise Center for Urban Research, the report chronicled Boise's attempts to get the best system for its dollar.

The initial contact with vendors was made through a letter to each main office describing the project and asking that a representative contact the city.

When representatives called, each was asked to provide hardware reference manuals, the operating system manual, utility reference manual, language reference manual, linkage editor manual and price list.

Some small business system vendors were reluctant to supply prices, so the city turned to Datapro Research Corp.'s reports on minicomputers for approximate pricing information, the report noted.

The first formal presentations were limited to the researchers, the report em-

phasized. "Public officials and other city administrators did not participate. This was done in order to emphasize the researchers' authority during early investigative stages and reduce the 'politicking' so frequently associated with large computer acquisitions."

After the initial presentations, the vendors were offered time with public officials — but the researchers were present during those interviews to make sure the information presented was consistent with the previous technical evaluation.

In a second round of review, manufacturers were asked to provide more information. Systems considered included the Data

General Corp. Eclipse C/300; Digital Equipment Corp. PDP-11/45 and 11/70; General Automation SPC-16; Hewlett-Packard 3000; Interdata 7/32 and 8/32; Modular Computer Systems, Inc. (Mod-comp) IV; Prime Computer's 300; Systems Engineering Lab's 32/50; the Varian V70; Burroughs B1700; IBM's 3/15, 370/115 and 370/125; the NCR Corp. Century; and the Univac 90/30.

At this point, machine instruction timing figures were requested so "a performance measure could be developed without benchmarking," the report noted. This was a difficult request for some vendors because of

(Continued on Page 48)

Datapro Finds Mini Users Happy; Only Programs, Support Lacking

DELRAN, N.J. — Minicomputer users were generally pleased last year with their equipment, operating software and maintenance service, according to a survey made by Datapro Research Corp.

Based on replies from 758 users with a total of 1,738 minicomputers and small

business systems, the survey showed the only significant weaknesses were in the areas of applications programs and technical support.

Although business data processing accounted for over 60% of the applications on the systems, most of the systems were used for more than one application.

In-house personnel wrote much of the applications programming for the systems; users also variously turned to vendor personnel, ready-made programs, proprietary packages and contract programming houses.

Few Outside Peripherals

The majority of users did not use any type of independent peripherals on their systems, the survey showed.

Only four of the systems with 10 or more users responding rated 3.4 or more on a scale of 1 to 4, with 4 representing "excellent."

Basic Four's 10 responding users gave their 12 systems an average rating of 3.5 overall. Reliability of maintenance, ease of operation, the operating system and compilers and assemblers got high marks.

Eleven users with 13 Digital Equipment Corp. Datasystem 300 CPUs gave that system a high 3.6 overall rating. DEC users liked the system's ease of operation, reliability of maintenance, compilers and assemblers and ease of programming.

IBM's 3/15 with 29 users was rated at 3.5 with users giving high marks to the system's ease of operation, reliability of maintenance, peripherals and responsiveness of maintenance service.

Microdata's Reality system, rated by 10 users with 13 systems, got a perfect score on ease of operation.

The 69-page report also contained specifications of 288 systems including pricing. It costs \$12 from the researchers at 1805 Underwood Blvd., Delran, N.J. 08075.

Both Faster Than 21MX

HP Unwraps 1000 Series CPUs

By Esther Surden
Of the CW Staff

PALO ALTO, Calif. — The Hewlett-Packard Co. (HP) has taken the wraps off the processors it uses in its 1000 series, introduced last October.

Called the E series, the two CPU models are now available to users. They execute programs 70% to 100% faster than the earlier 21MX M series processors, HP claimed.

The firm will continue to support the M series, a spokesman noted.

The CPUs were designed for applications requiring multiterminal use and more complex forms of data analysis. They are in the range of the Data General Corp. Nova 3 and the Digital Equipment Corp. PDP-11/34, according to the spokesman.

The added speed is a result of what HP dubbed "variable microcycle timing" (VMT) in the CPU's 24-bit microprogrammable control processor. VMT allows the control processor to run in cycles of dynamically variable length, the spokesman explained.

Most instructions can run in 175 nsec, but a cycle can be "stretched out to 280 nsec for those few instructions that need it," he added.

The E series control processor also includes a user store space that can be expanded to 8.5K 24-bit words, HP said. The

store can be written in either read-only or random-access memory, the spokesman noted, and a set of microprogramming software including a micro assembler, editor, loader and debug utilities is offered.

The control processor is available to the user under software control. Users can transfer routines from disk or other sources directly into the store, the firm said.

The E series contains a microprogrammable processor port to the main data bus which makes transfers possible at burst rates up to 5.7M word/sec. Through another method called microprogrammable block I/O, the user can bypass the normal I/O structure and use special interface cards to move blocks of data at up to 1.5M word/sec, HP said.

One version of the E series processors is an 8-3/4-in. model with space for nine I/O cards and five memory cards for up to 80K words of memory; the larger version supports 14 I/O cards and 10 memory cards for 160K words of memory.

The smaller version with 32K words of memory costs \$13,900 with a Fast Fortran processor and 1K writable control store.

The larger version with 160K of memory, Fast Fortran processor and maximum user control store costs \$36,150 from the firm at 1501 Page Mill Road, Palo Alto, Calif. 94304.

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For Inventory, Production Control Firm's Figures Show Mini Use Justified

PARAMUS, N.J. — At Datascope Corp. here, a computer is considered a tool to support manufacturing operations and, as such, it must justify itself to stay.

The small-scale system installed in 1974 has done just that, according to Paul B. Arnstein, vice-president of manufacturing, who said its use has reaped the firm an estimated annual payback of 3 to 1.

Not only has inventory turnover been improved by about 33% over the past two years, but product volume doubled while the workforce stayed the same. During the same period, the indirect cost of materials remained about the same, he indicated.

The firm, which makes medical instrumentation and special devices for hospital and emergency care facilities, used both a manual recordkeeping system and an outside computer service for inventory and production control before it installed an NCR Century 101.

"Outside services are not tuned to the customized needs of the small operation," Arnstein said. "If you want real flexibility, you have to control the computer yourself."

"We were novices in 1973," Anthony Marino, production manager, recalled. "We found NCR packaged programs more adaptable to modification than others Datascope investigated."

The "use of a computer has caused little change in our concept of management," he added. "However, it has made possible the effective implementation of these concepts."

Rolling Forecast

Datascope's production is based on a 12-month rolling forecast updated every quarter. "The forecast should be relevant for three to six months," according to Marino.

Depending on the forecast, the system explodes the products to their lowest levels, combining parts and fitting them to time frames. The result is a time-framed listing of all of the parts required for the 12-month period coupled with a netting out of these requirements against stock balance and open order commitments.

The system stores on disk all assemblies, subassemblies and components needed to make every product and an inventory record of over 3,000 different parts. It matches the requirements against existing stocks and open orders.

If the analysis indicates 100 of a certain part are needed every month and there are 1,000 in stock and none on order, the computer will report a demand to replenish inventory of this item in the eleventh month.

Allows Discrete Management

The system enables the company to "manage each item discretely and not get more than we need in terms of usage of a high-cost part," Marino noted. "We purchase, receive, inventory and control very carefully. By knowing the structure of our inventory, we can place emphasis where it will do the most good."

For example, a high-priced part probably would not be stocked in any number beyond its forecast need nor too far in advance of its intended use.

The mini is also utilized to track

direct labor distribution by product, department, quantities and standards. Each of the employees in the direct labor pool keeps a daily record of tasks, quantities and times.

Figures Processed Weekly

The figures are processed weekly by the computer to give management a rundown on labor distribution in hours and dollars to learn product costs. Standards also are matched to actual perfor-

mances to rate productivity.

A work-in-process inventory is taken every three months and the system is used to value every in-process item to its point of completion.

"The inventory tells us where the company is at that moment," Marino said. Before the computer was installed, the company took only year-end inventories. "Now, through tighter inventory control, we can project the final results earlier."



Paul Arnstein (left) and Anthony Marino check production figures generated by NCR Century 101.

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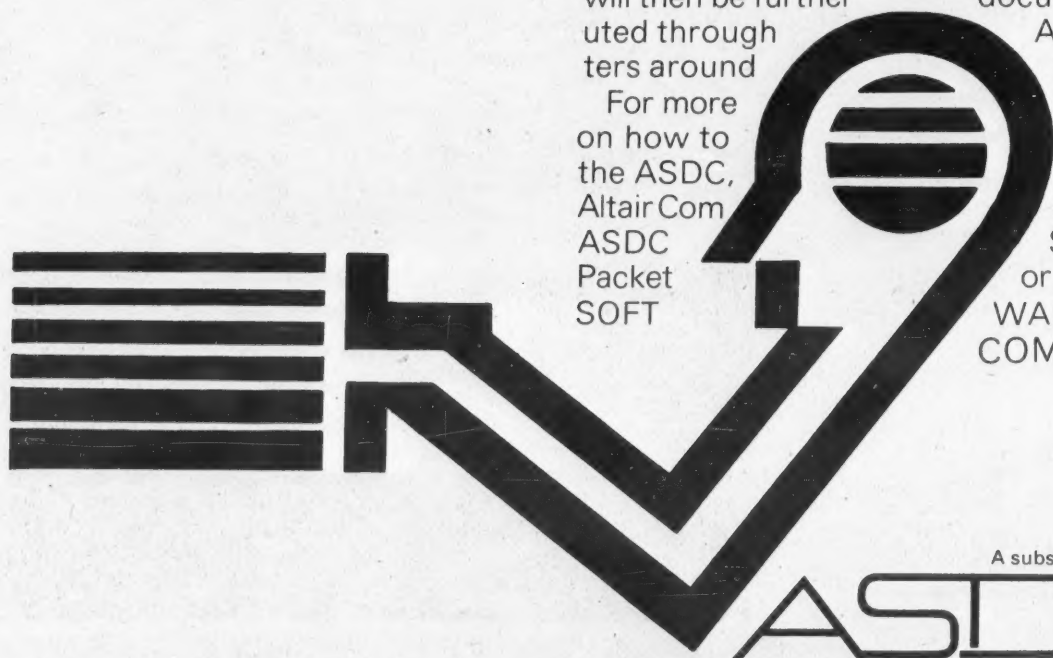
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see next page for a listing of Altair Computer Centers

Software Package Must Fit Exactly

By Jon David

Special to Computerworld

Minicomputers have been regularly coming down in price. The hardware, however, is worth no more than the programs it runs. People write programs and people have been becoming more and more expensive with the passing years.

We have reached a point where companies no longer look to buy mere computers; they want working computer systems. They want integrated hardware and software combinations that solve problems.

Even when software costs do not make the total package price prohibitive, potential

buyers want further guarantees that the system they are considering will work when installed.

Ideally, potential buyers want to see prospective systems already working.

From the user's standpoint, the ideal way to minimize software costs would be to purchase a ready-made package seen running on a hardware/software system. This ideal, however, often only exists on paper.

Historically, packages were not developed to be resold, but rather developed under contract to a particular customer. They were then offered for sale to get, so to speak, something extra for nothing.

Packages perform specific sets of functions in predefined formats. Generally, they service a particular industry or industry segment.

The suitability of a package for particular needs is often fully dependent on the matching of operations and requirements with

Readers are urged to reply to this or any other Minicomputer Exchange article. This is your column, a chance for you to exchange views on the various topics confronting the minicomputer user, a chance to tell the vendors what you are thinking and to let your fellow mini users know about pitfalls or new techniques in this area. Letters or manuscripts should be addressed to Minicomputer Exchange, Computerworld, 797 Washington St., Newton, Mass. 02160. Double space, please.

those of the user for whom the packaged programs were originally developed. Although businesses will have requirements that sound familiar (such as order entry, invoicing, accounts payable and receivable, sales analysis and the like), in practice, the details of those similar sounding requirements are quite different.

The "best" type of system you can get is one in which all operations are a subset of present work. With such a system, there is no worry doing new things improperly; you just do less than before and get more for those efforts.

The worst thing you can do is try and adapt your operations to a different system; even if the new system works, your people may well not be able to work with it.

If you do not exactly fit a preexisting package, don't use it. An exact fit is 100% satisfaction; a 98% fit is equivalent to being 2% pregnant.

Vendors of packages will sometimes offer to adapt those packages to your specific situation. Such adaptation eliminates the guarantee of seeing the system in operation before you buy it and introduces additional programming costs.

Additional programming costs frequently bring the total package price up to or more than the price that would have had to be spent to have a custom system developed. Moreover, you are frequently left with a patchwork system doing jobs it was not made to do; such a system may not perform satisfactorily, may not expand adequately and may in other ways prove unsatisfactory.

In the not too distant future, we may move into an era of personalized computers and computer systems. These devices will be created to do specific jobs, and you will be able to buy one in much the same way you buy a typewriter today.

At present, however, the closest you can come to that is a software package which makes hardware immediately suitable for a particular job. Unfortunately, there are relatively few existing packages and these packages only service specific requirements within specific industries.

If you can get an exact fit with a package, and the important word is exact, take it; such a situation is best in every way. If you cannot find a package which totally and fully satisfies you in every way, avoid it; in the long run, you'll be doing yourself a favor.

David is president of Minicomputer Industry National Interchange (Mini), a professional society treating minicomputers, microcomputers and associated technological techniques, and is an independent consultant.

Wangco Has Super Disk

LOS ANGELES, Calif. — The Model 78 Super Floppy from Wangco, Inc. features 3 msec track-to-track access, according to the company.

The floppy features an optional autoloader capability, double-density coding, hard and soft sectoring and the ability to daisy chain up to eight drives in a system for a total capacity of 51.2M bits, Wangco said.

The rack-mountable or desktop disk costs under \$500 in OEM quantities, the firm said from 5404 Jandy Place, Los Angeles, Calif. 90066.

Minicomputer Exchange

Qantex Data Storage Systems Interfaced to Interdata Units

PLAINVIEW, N.Y. — Qantex has announced an interface from Process Dynamics, Inc. that will link any of Qantex's cartridge data storage systems to Interdata, Inc. models 70, 74, 7/16, 6/16 or 8/32 computers, according to a spokesman.

The interface allows extended memory capacity for Interdata computers from 2.88M bytes to 23M bytes, depending upon the data storage model selected, the spokesman stated.

Recording at 30 in./sec with a packing density of 160 bit/in. phase-encoded yields a data transfer rate of 48,000 bit/sec, he said.

The interface is a single card designed to

be embedded in the Interdata computers. The unit is compatible with Qantex models 2200, 2400, 2710 and 86008 formatters, according to the firm.

It responds to all the commands used by the Interdata magnetic tape system M46-470 and occupies the same address spaces, the spokesman added.

The card costs \$994 in unit quantity from Process Dynamics, Inc. at P.O. Box 283, Allenwood, N.J. 08720.

Tally Matrix Printer Exceeds 200 Line/Min

KENT, Wash. — The Model T-1602 160 char./sec matrix printer features bidirectional printing that can achieve speeds of more than 200 line/min, according to its vendor, Tally Corp.

The printer, which can include a selection of interface controllers for minicomputers, incorporates a microprocessor that computes the shortest distance to the next print position, Tally said.

The unit slews at 8.5 in./sec and moves the print head at an accelerated rate when not printing, a spokesman noted. It can handle an original and four copies and forms widths from 4- to 15 in., the company added.

Other features include a snap-in cartridge ribbon and a digitally controlled print head advancement. OEM prices begin at \$3,115.

Tally is at 8301 S. 180 St., Kent, Wash. 98031.

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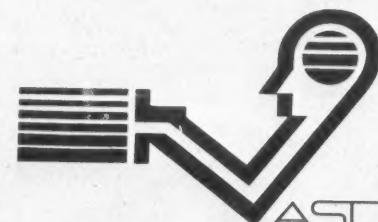
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Boise Says 'No Thanks' to Big Systems

BOISE, Idaho — "Most centralized data processing organizations with their large computers are less effective in providing information services than had been originally anticipated," according to a report called "Minicomputers: An Alternative Approach to Municipal Information Systems."

The report includes a summary of systems feasibility and design studies conducted to identify the various DP alternatives available to Boise. It then describes the thorough method of study this city followed in acquiring its minicomputer (see story on Page 44).

When considering whether to follow the large system route or go with minicomputers, the researchers concluded that large systems are characterized by "poor service at a very high cost."

There are "significant limitations inherent in large centralized systems," the report said. "First, large-scale integrated systems are highly complex by design.

The... computers traditionally used in these systems are very complex. Frequently, both the systems and the computers used to implement them are poorly understood by the naive user.

"Occasionally this lack of understanding is the result of a 'de facto policy' of the DP organization to keep the user and even the management in the dark," the report stated.

Another limitation of centralized systems is that "vendors of a large system often keep DP organizations in the dark by selling 'solutions, not tools,'" it added.

Many DP departments take the advice of

sales representatives when it comes to upgrades and software. By doing this, the DP department abdicates its responsibilities and loses any real control over hardware expenditures, the report contended.

The city initially considered some large systems, the researchers said, but the "overhead encountered in multiprogramming, virtual memory, telecommunications and data bases is far greater than anyone, except possibly the hardware vendors, expected it might be."

The next step for the city was to consider minicomputers, and this it did thoroughly.

City Does Homework on Minis

(Continued from Page 44)

the nature of their hardware, it said.

"The validity of measuring machine performance in this way can certainly be criticized if computer throughput is the principal measure desired," the study noted.

Therefore, other factors such as operating system efficiency, memory management, I/O transfer rates, communications transmission rates, device contention and the particular mix of tasks awaiting processing at any point in time were also considered.

Three Hardware Configurations

In addition, the researchers developed three hardware configurations that were to be used in the evaluation of minicomputer price specifications. The configurations covered the growth of a mini system.

Hardware and software criteria were examined in depth, as was vendor support, and then the city arrived at the actual vendor selection process.

Six proposals were received from DEC, Interdata, IBM, Modcomp and Univac; the Modcomp bid for \$112,414 was accepted for an initial configuration.

The Modcomp system was selected on the basis of price support, operating system and the way the operating system functions were supported. Software other than operating software and hardware performance played a smaller role in the final analysis.

The 121-page report, number UOP 18, is available for \$7 from the Publications Center, National League of Cities/U.S. Conference of Mayors, 1620 I St. N.W., Washington, D.C. 20006.

Multiprocessor Micro Available

ST. LOUIS — Artronix, Inc. has announced a multiprocessor modular microcomputer system designed for medium- and small-sized businesses.

Using a building-block approach, the Modulex system is based on a bidirectional communications bus. The bus is a multilayer printed circuit board which allows communications between the system modules connected to it at up to 10M byte/sec, according to a spokesman.

The basic CPU is a 16-bit processor with seven general-purpose registers and 98 instructions. Memory is MOS random-access in 16K-byte increments; cycle time is 480 nsec.

Up to 64K bytes of memory can be addressed on the bus or up to 1M byte with each memory management unit used, the firm said.

Control between multiprocessor buses is

accomplished via asynchronous Real Time Link (RTL) modules. Data transfers between buses are made through the memory management modules.

Each multimodule bus accepts several CPU, RTL and management units, the company said.

The system is available with a range of peripherals including array processors, a digital video graphic system and disks.

The operating system software is also modular, the firm said. Called MX/OX, the software is divided into semi-independent modules, each performing a certain class of functions, the spokesman explained. It supports multiterminal multiprogramming.

A two-CPU 96K-byte system with 160M bytes of mass storage, line printer and 16 terminals costs \$100,000. Artronix is located at 1314 Hanley Industrial Court, St. Louis, Mo. 63144.

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AT&T Participation Questioned

Industry Advocates Standards for EFT Area

Sycor Establishes Distributor Program

ANN ARBOR, Mich. — Sycor, Inc. has established a domestic distributor program to help market Sycor terminal products and associated peripherals to end-users through the addition of value-added software.

"The establishment of a domestic distributor organization will help the company penetrate new market opportunities which it has heretofore considered economically unfeasible," Paul C. Lavoie, Sycor vice-president/marketing, said.

"In turn, the end-user will enjoy the benefits of dealing with a local or regional distributor who is a specialist in the application software area," he added.

Prospective distributors are regional software houses and service bureaus who market to specific industries. Under the distributorship plan, they will purchase equipment from Sycor and then may lease it to end-users through third party firms or their own organization.

Sycor will continue to offer its field engineering support to distributors and their end-users through a standard Sycor maintenance agreement.

The distributor organization is not intended to replace or compete with the existing Sycor sales force, according to the firm.

DG Delivers Micronovas

SOUTHBORO, Mass. — Data General Corp. (DG) made first deliveries of its Micronova computers in early December. DG had originally scheduled deliveries for "late fall."

The first customers were the Data Communications Corp. and Southern Railway.

Supershorts

Curtis 1000 has begun marketing BASF magnetic media products as part of its "one-stop shopping center" concept.

By Molly Upton
Of the CW Staff

SAN FRANCISCO — Members of the DP and communications industries advocated competition and standardization in the electronic fund transfer area (EFT) but differed on just how these goals are to be achieved at recent hearings here.

Speaking before the National Commission on Electronic Fund Transfers, industry representatives' suggestions on the establishment and monitoring of standards ranged from laissez-faire and natural evolution to administration by existing standards organizations.

Most agreed competition can be nourished by allowing common carriers to participate in the EFT area only on an arm's-length basis — with separate companies — in order to eliminate the threat of cross-subsidization.

Some opposed AT&T participation in the product area. The Computer and Communications Industry Association (CCIA) advocated barring AT&T under any conditions.

IBM, while generally at odds with others' testimony on standards, agreed with the general tenor regarding AT&T's participation in the EFT market.

Richard J. Mindlin, an assistant NCR vice-president, told the commission it should identify areas where standards are needed and provide general guidance for their development.

The American National Standards Institute (Ansi) should be made responsible for developing the standards because it has a reputation for accommodating the concerns of all interested parties in the development of standards, he suggested.

Fred Meier, vice-president of corporate product management for Burroughs Corp., also advocated leaving the establishment and administration of standards to the appropriate national and international organizations.

"Burroughs supports this approach that results in formally

generated and adopted standards," he told the commission.

Meier and others warned of the insidious nature of de facto standards which put the inventor at a competitive advantage over the rest of the field. Bell's Transaction Network Service (TNS) is an example of a de facto standard, he said.

Federal Control Urged

Jean Tariot, chairman of IncoTerm Corp., said there should be federal control of standards and participants in the EFT area.

Congress should empower appropriate authorities to "measure the adherence to the developed yardsticks and be able to deny

qualification of an EFT service through legal means if appropriate levels of performance are not met," he said.

In addition, the authorities "should operate or fund a national laboratory to sustain the level of technical expertise necessary to provide leadership, particularly in the areas of security and privacy," he recommended.

Design of all encryption devices should be controlled federally and made available at a standard price for all users, he added.

Tariot had a broader view of standardization than some speakers. While most were concerned with technical standards, he said the area of tax accounting

and utility regulatory standards also needs scrutiny.

Regulated common carriers can currently depreciate leased equipment over seven to 30 years, while a DP maker has only five to eight years, he said.

However, AT&T and IBM were more lax in their approach to standardization.

IBM Vice-President Wallace C. Doud told the commission that "as the evolutionary process of systems design, development, implementation and utilization takes its course, the needed standards will be defined, developed and implemented by the parties involved."

"We believe, for this type (Continued on Page 52)

Retail Terminal Market Seen Soaring As Bank Transaction Networks Develop

By Toni Wiseman
Of the CW Staff

NEW YORK — The U.S. banking system is attempting to convert from a paper-driven processing system to an electronic-driven one and the market potential is hardly tapped, according to a study by Frost & Sullivan, a market research firm here.

In fact, the study projects that the installed base of retail terminals hooked to bank transaction networks will come to \$520 million cumulatively through 1985.

Banks and other financial institutions plan to give "major attention" to consumer retail transactions over the next decade because a tremendous market is at stake: the 63 billion financial transactions in the retail environment in 1975 will climb to 87 billion transactions by 1986, the study stated.

Moreover, the study said, 16% of that paperwork is generated by point-of-sale transactions and to reduce check transactions a new form of payment, the debit/check guarantee, will account for about

five billion transactions, with another 3.5 billion transactions made by bank credit card, all by the end of 1986.

Frost & Sullivan estimates that while in 1975 85% of payment transactions were cash, that figure will decrease to 80% by 1980 and 77% by 1986. Conversely, check/debit card payments will increase from 8% currently, to 9% in 1980 and 11.5% in 1986.

The check/debit figure itself can be divided into 100% check payments in 1976, falling to 92% in 1980 and 50% in 1986 when check guarantee/debit payments will equal check transactions, the study said.

The study outlined key retail market segments for terminal transactions on the basis of transaction volume, number of end points and average ticket value.

Supermarkets are clearly an attractive retail segment since they account for 35% of the transactions and only 12% of the points-of-sale, the study noted, and drug stores capture 19% of the transactions through only 9.2% of total

points-of-sale.

Liquor stores, department stores and gas stations are also prime targets, it noted.

"The installed base of financial terminals in the retail environment is extremely small. We estimate no more than 4,500 authorization terminals installed by mostly commercial banks in the retailing environment," the study reported.

"Thrifty's have installed approximately 485 banking terminals in various retail sectors," it added.

"The market potential for retail financial terminals/systems has hardly been tapped," Frost & Sullivan claimed.

The study emphasized that investments in electronic funds transfer (EFT) systems involve relatively high risk, long pay-out periods and the requirements for large transaction volumes. But, they expect that volumes will build as the years pass and EFT services will find widespread acceptance by consumers and merchants.

The requirements to provide (Continued on Page 50)

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Information Terminals Corp. Seeks Visibility

SUNNYVALE, Calif. — Many changes have come about in the media area in the past few years, some with far-reaching impact.

One company which has been positively impacted is Information Terminals Corp. (ITC), a manufacturer of cassettes, cartridges, floppies and magnetic cards.

Besides selling products under its own label, ITC supplies private label products to a number of major OEMs and marketing organizations.

In previous years, ITC rented manufacturing space on another firm's line. They have since moved in-house which allows much tighter quality control, according to Robert H. Katzive, product manager/marketing.

"Basically we perfected our product out-of-house and then moved in-house once it was up to specs," he said.

"You have to move a lot of tape to make in-house production a pay-off," he added.

While business is good at ITC, with sales for fiscal 1976 peaking at \$12.2 million, the company recently staged sales promotion for its disk products to introduce more people in the DP area to ITC products.

"We supply just about everyone with digital cassettes and a good portion of the floppy market, but we don't have high visibility," Katzive said.

Terminals Mart Seen Soaring

(Continued from Page 49)

banking services in the retail environment will in many, if not most cases, be delivered as "self service banking" with no merchant involved, Frost & Sullivan predicted.

The cash dispenser can be an ideal solution in selected retail segments for this approach but will require equipment at costs not yet available on the current market, it said.

"Equipment that costs in the \$8,000 range must be achieved to make ATM units economically viable for large-scale retail implementation," it stated.

"It is our opinion that any movement toward the combination of banking and payment transactions at the point-of-sale will be very slow and will probably not have a major impact in the next ten years," Frost & Sullivan stated.

The study forecast total financial terminal sales of \$520 million for the 1977 to 1986 period, with authorization/electronic cash register terminals the largest segment in terms of dollars and dial-up telephone units.

"Some people go blithely through life buying everything from IBM. Our floppy, for instance, is very price competitive and it's disconcerting that people don't know we manufacture a number of products," he said.

In terms of the markets ITC addresses, cassettes are still in a growth stage, Katzive said, but their growth rate is slowing down somewhat as alternate choices become available. "But there is still good solid growth potential in the market for a number of years, particularly overseas," he noted.

And, he said, the floppy area is growing "like gangbusters," while 1/4 in. tape cartridges are also starting to do well as a volume item.

As a percentage of business, cassettes and floppies dominate ITC's revenues, particularly cassettes, he said.

But, while the firm still does more business in cassettes, Katzive expects the ratio to equalize in a couple of years due to growth in the floppy area.

At the same time markets are growing, a certain amount of con-

centration is inevitable, he stated. "The price competition is getting fierce and only those with economy of scale will survive in the mini-media world."

Firms not already established in the cassette market will have a terrible time getting in," he said, "since there are already enough of us to take care of everyone."

And, he added, "who would want to come into a market dominated by ITC, 3M and Japanese imports (which cannot be disregarded) and try to compete?"

Cbema Elects

WASHINGTON, D.C. — E. Lawrence Tabat, president of Dictaphone Corp., has been reelected chairman of the board for the Computer and Business Equipment Manufacturers Association (Cbema) for 1976-77.

In addition, Gregson L. Barker, president of Uarco, Inc. was elected to a one-year term on the Cbema board and Paul C. Ely, vice-president of Hewlett-Packard Co., to a three-year term.



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Interstate Tariffing in Question

CCIA Plans Suit Against FCC in Dataspeed 40/4 Case

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. — The Computer & Communications Industry Association (CCIA) intends to file suit against the Federal Communications Commission (FCC) in an effort to block this week's expected FCC ruling to allow interstate tariffing of AT&T's Dataspeed 40/4.

The proposed CCIA suit will seek to enjoin the ruling pending

a full court review on the merits and also a reversal of the decision.

CCIA Director A.G.W. (Jack) Biddle said the move is in response to the FCC's "press release decision" [CW, Dec. 6] in which the Commission indicated it intends to reverse an earlier position and allow, at least temporarily, use of the Dataspeed 40/4 with interstate connections.

The FCC has not yet issued the text of this decision. However, the

FCC said its final decision will hinge upon findings by the Computer Inquiry II, which has been charged with examining the boundary between data communications and DP offerings [CW, Aug. 9].

Biddle termed the FCC announcement "almost a preordainment of the outcome of the Computer Inquiry II."

At issue is whether AT&T, a "regulated monopoly common

carrier," should be allowed to compete in the DP arena.

Three Are 'Unanimous'

The CCIA, the Computer Business Equipment Manufacturers Association (Cbema) and IBM "are unanimous in agreeing that the Dataspeed 40/4 is in fact a computer device — not a communications terminal — and as such is an illegal offering under the FCC rules now in force."

The CCIA contends the forthcoming FCC ruling is in "clear violation of the separation between products and services offered by regulated common carriers and those offered by the non-regulated computer industry as called for in the Computer Inquiry I rules."

Sanders Associates attorney Sherwood Lewis said he wants to see the full decision before commenting in depth, but added he thinks the FCC is wrong if the full text does indeed reflect what the announcement indicates.

"It would unsettle the marketplace," he added.

The CCIA called for all customer premise equipment (CPE) to be detariffed and made offerable only by unregulated entities. CPE includes telephone equipment, PBXs, electronic funds transfer devices and information processing terminals, Biddle said.

AT&T could compete in the CPE area only through subsidiaries operating at arm's length, he said.

Thus, AT&T would have to separate Western Electric from its operating companies and separate Teletype Corp., thus eliminating possible cross subsidization.

"If you want to compete in the computer marketplace, you have to get out from under your mother's skirts," Biddle told AT&T.

Walter Hinchman, FCC Common Carrier Bureau chief, formulated a ruling stating the Dataspeed 40/4 was indeed a DP device and therefore could not be tariffed on an interstate basis.

The Computer Inquiry II has asked for all filings to be submitted by January 10. However, Biddle observed, IBM and others may ask for further delays in order to include this latest development in their positions.

Biddle said he doesn't expect any opinion from the Computer Inquiry until late fall of 1977.

Wescon Date Changed

SAN FRANCISCO — The Western Electronic Show and Convention (Wescon) has changed its dates to avoid conflict with Yom Kippur.

For the first time, Wescon will be a three-day rather than four-day show, opening Sept. 19 and running through Sept. 21 in Brooks Hall and San Francisco Civic Auditorium here.

The show had previously been scheduled to run Sept. 20-23.

The Monday-Wednesday scheduling is a one-time decision and not a change in Wescon policy, according to the organizers. The exhibitors themselves voted for a test of a three-day format.

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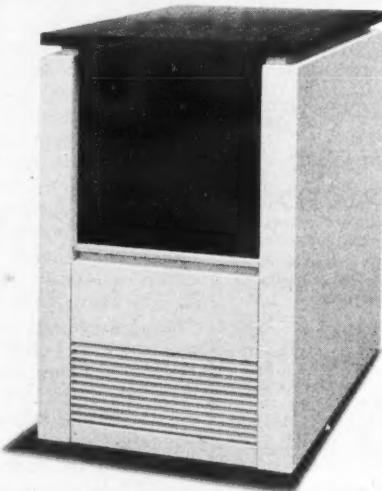
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Vendor Rebuts Study Cartridges To Outdistance Cassettes

PLAINVIEW, N.Y. — While some industry observers have seen cassettes retaining an edge in the magnetic recording market, others definitely do not see the same picture.

The Qantex division of North Atlantic Industries, in fact, believes that 1980 cartridge memory products will far outdistance the \$8 million estimate quoted by Venture Development Corp. [CW, Nov. 15].

After all, IBM has adopted the 3M DC300A cartridge as standard, as have Ma Bell (via Western Electric), and the U.S. Navy, according to Qantex president Joel A. Kramer.

In addition, Hewlett-Packard has standardized on the 3M minicartridge, DC100A, for some of its desk-top calculators and its computer system data terminals, he said.

Qantex's own estimates for total 1980 shipments of both 3M DC300A and DC100A transports and systems is up in the 200,000 region, he said, noting that his firm is looking for some 20% of that figure.

"Even though development of the minicartridge will lower the average systems price from today's \$1,500 or so, we believe an upswing in military usage will sustain shipment dollar volumes.

"For example, the standardized AN/USH-26 militarized 3M system that we produce for Naval Electronic Systems Command goes for roughly \$5,000 per cartridge drive," Kramer said.

The mini cartridge, DC100A, offers advantages over the cassette, in a one-on-one comparison, so that a decline in cassette market share seems inevitable, he said.

For a start, the mini cartridge permits 1,600 bit/in. recording density on multiple tracks, versus 200 to 800 bit/in. for the cassette. That's a 3-fold advantage in storage capacity for the mini's 140 feet of tape, compared with the cassette's 300 feet, he stated.

Tape speed and data rate are other factors, he said.

At 30 in./sec tape velocity and 1600 bit/in. density, the cartridge provides a data transfer rate of 48,000 bit/sec.

A cassette is typically operated at 4 to 8 in./sec, which at 600 bit/in. density provides a typical 4,800 bit/in. data rate. A tenfold advantage for the mini cartridge. And all of the increased performance comes with increased data reliability, Kramer said.

This difference gains a real perspective when it comes to filling up a 2,000 character CRT screen from tape memory. At the cartridge's 6,000 char./sec data rate, the screen's 2,000 character display is completed in about one-third of a second.

The cassette introduces a wait of about four seconds.

That may not seem significant,

but if you want to enter fresh data, four seconds before you can poke the keyboard is a long delay. Delays of this sort are just the factor that spawned the key-to-disk industry from punched cards, he claimed.

Data cartridges also offer major mechanical advantages over the cassette, he claimed. Built-in cartridge tape guides eliminate skew, permit tape interchangeability and error-free operation. The cartridge's inherently constant tape tension, provided by the internal iso-elastic drive band, ensures a fixed tape-to-head angle and record/reproduce fidelity, he added.

Not widely appreciated is the fact that the 3M cartridge requires only one drive motor; a single capstan drives the iso-elastic band that turns both tape reels. A good cassette transport requires a capstan, and two reel motors as well, he said.

"The upshot, in our view, is that there are few reasons for building a new piece of equipment to use the cassette, when the cartridge will do a far better job at potentially lower overall cost," he said.

Industry Advocates Competition, Standardization for EFTS Mart

(Continued from Page 49)

system, the major areas of standards requirements will be in the areas of media, such as the credit card, and information interchange, not in the hardware elements of the system."

IBM sees "no need for imposition of government standards in this area," Doud stressed. "The user, suppliers, producers and government have all the capabilities and interests necessary to develop and use the standards required for EFT."

These joint interests, he said, "will give us the greatest assurance the standards will be produced on a timely and economical basis."

Doud urged the commission to contribute to public understanding of privacy and data security as they relate to EFT. The commission should help develop a set of principles to "protect the privacy of the individual which would help ensure public acceptance and confidence in EFT systems."

Responsibility for the mechanisms to ensure data security rests with the supplier, he said.

AT&T, while advocating technical standards such as communications network standards for entry devices, feels "the present standardization process is adequate and appropriate for the evolution of EFT standards."

William P. Stritzler, market manager of the finance industry for AT&T, also described to the committee the Bell TNS, which several other witnesses berated as an example of AT&T's ability to set de facto standards and cross-subsidize its EFT product pricings through revenues from other areas.

AT&T's participation in EFT was a controversial issue addressed by many when speaking of the competitive environment.

IBM opposed government regulation of the supply of EFT

system equipment and said there should be a "separation between regulated communications services and data processing services such as EFT."

Tariot of Incoterm said AT&T should be restricted in the DP communications area to the common carrier transmission of data messages from point to point and should be prohibited from manufacturing and selling input and output devices for data transmission.

Burroughs' Meier also advocated having common carriers furnish EFT products through separate companies. But Burroughs feels existing legislation and the 1956 Consent Decree are "adequate to maintain free and open competition against unfair competition by AT&T and other common carriers."

Message switches should be regulated beyond that currently in existence for common carrier-provided facilities "only if private industry, operating in full competition, cannot supply this switching function," he told the commission.

Informatics Wins NSF Study Award

WOODLAND HILLS, Calif. — Informatics, Inc. has been awarded a grant by the National Science Foundation for a study leading to a report on "Current Knowledge and Opportunities in Numerical Data Indexing."

Informatics will be analyzing the state-of-the-art on indexing numerical data contained in scientific and technical literature; identifying problems associated with data indexing and data accessibility and assessing the progress of data indexing in journals, abstracting services and information centers.

Executive Corner

■ Gustavo J. Vollmer of Caracas, Venezuela and president of Central El Palmar, sugar manufacturer, has been elected to the board of directors of IBM World Trade Americas/Far East Corp.

■ Robert H. Keeley has been named president and chief executive officer of Dynastor, Inc.

■ William R. Zimmerman, president of Monogram Industries, Inc. was elected to the board of directors of Electronic Memories & Magnetics Corp.

■ Dr. William C. Leone, Thomas J. Klutznick and Harry G. Bowles will become members of the Datapoint board of directors, subject to shareholders' approval.

■ John A. Williamson has been elected vice-president of the board and John A. Lotz has been elected chief operating officer of Computerized Automotive Reporting Service, Inc. (Cars).

■ Norfleet R. Turner, president of Data Communications Corp. (DCC) was elected chairman of the board.

■ Fred J. Barla has joined the Valcomp division of Tymshare, Inc. to assume the position of vice-president and director of marketing and Wayne King has been named to the position of vice-president and director of engineering.

■ Louis B. Horwitz has been appointed president and chief executive officer of Datum, Inc.

■ George E. Devine has been elected president and a director of Data Reduction, Inc.

■ IBM vice-president Charles P. Bigger has been named president of the field engineering division.

■ James F. Burke has been named president of Control Data's Worldtech, Inc.

■ Joseph A. Crispino has been appointed president of the Compton Division of Genisco Technology Corp. and elected a vice-president of the firm.

■ Michael H. Smith has been appointed president of Lease Marketing Services, Inc., a wholly owned subsidiary of the E.F. Hutton Group, Inc.

■ Louis H. Benzing has been elected president and chief executive officer of Decision Data Computer Corp.

■ In a reorganization move at Olivetti Corp., Leon Harris has been promoted to vice-president of office products, and Phillip Present, vice president of systems operations.

■ Ronald R. Nickbarg has been named vice-president of operations for Microdata Corp.

■ Nestor M. de Armas has been promoted to vice-president of finance at Florida Software Services, Inc.

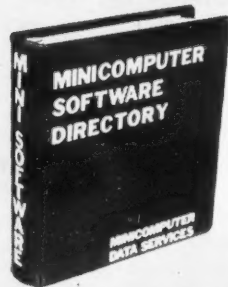
■ William H. Kaiser has been appointed vice-president/general manager for SSR Systems, Inc.

■ Charles E. Priddy has been named vice-president of market-sales of Terminal Data Corp.

■ Dr. Donald E. Johanson has been appointed vice-president of engineering and Phillip Blake has been appointed manager of advertising and marketing support services of CSP Inc.

■ Gary E. Liebl has joined the Columbia Pacific Resources, Inc. (CPR) staff as vice-president.

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MDS Goes After Distributed Processing With Microprocessor-Based Terminals

By Toni Wiseman
Of the CW Staff

PARSIPPANY, N.J. — Mohawk Data Sciences (MDS), the company that "began it all" by knocking off the keypunch over a decade ago, said it soon will announce a new product line that competes directly with all other terminal-based systems in the distributed processing field.

"We will announce a major family of products that will broaden our strong position in traditional data entry markets and carry us directly into intelligent terminal and remote processor markets," according to Douglas A. Davidson, senior marketing vice-president.

The new product, which will be introduced by the end of January, includes a microprocessor but is basically a terminal product, and therefore a logical evolution of MDS' product line, according to Paul R. Jolicoeur, director, corporate marketing operations.

The new product line is one of a series of steps taken by MDS since its new management team, headed by Chairman Ralph H. O'Brien, took control in March 1975.

Since that time, MDS said it has turned around its financial situation, earning a "substantial" profit, in the most recent fiscal year ended April 30. For the six months ended Oct. 31, the company reported revenues of \$73.9 million and earnings of \$2.2 million. This compares with revenues of \$80.6 million and earnings of \$2.4 million in the year-ago period.

This period of "black ink" is a recovery after losses, due largely to acquisitions, which have now been turned around and incorporated into the overall scheme of things, Jolicoeur said. The acquisitions included Colorado Instruments, Analox (printers), Marshall Data Systems (disk drives), Bucode, Inc. (tapes) and Atron Corp.

Se 55% of MDS' revenues are derived from non-U.S. users, and an even larger percentage of installed equipment is located in more than 60 foreign countries in which MDS either sells directly or

through distributors.

About two-thirds of the equipment is leased through MDS, which means a large portion of revenues are from rentals and maintenance, Jolicoeur said. The largest slice of revenue, he noted, is centered around the "classical" 1200 and 2400 systems.

In addition to its financial moves, MDS' management team has consolidated all manufacturing at its plant in Herkimer, N.Y. and established an advanced software development group in West Caldwell, N.J. This group is responsible for the operating system and compiler language to be used with the new distributed products family, Davidson noted.

Distribution, User Base Key

"Mohawk's broad distribution capabilities, and its direct service force, is one of the great strengths we bring to any product marketing endeavor," Davidson said.

"Our 6400 and 1100 Data Recorders were responsible for creating a new industry — the data entry industry," he said, adding that MDS has over 3,500 users worldwide.

Davidson said both the industry and Mohawk are much more stable now than at any time in the past.

The data entry business of traditional key-to-disk, key-to-tape and other high-volume data entry products continues to enjoy market acceptance.

This runs counter to what many industry analysts have forecast in recent years and is largely the result of two forces which MDS plans to leverage with its current product lines.

One of those forces is the infrastructure of batch-oriented applications which MDS sees assuring both the permanence and vitality of the key-entry market-place.

"The data entry market is not dead," Jolicoeur asserted, noting that "many of the intelligent terminals sold today are basically doing data entry functions."

The other force MDS plans to exploit is the technological innovations which manufacturers

have added to enable large central-site users to move gradually away from single processing centers to slightly more distributed data capture facilities.

Communications links, software emulation packages, the addition of new functions, enhanced editing and validation techniques and expanded capacities of large systems are a few of the technological innovations Davidson cited as reasons why the basic central-site data entry business has remained strong.

"I would also have to add competitive fatigue to the list," he said, explaining that some suppliers of key-entry equipment have been unable to sustain their businesses in recent tight-money markets, and have been forced either to withdraw from the market generally or become much more selective in establishing sales targets.

Users' wants today are not drastically different from a year or so ago; things tend to be more evolutionary, Jolicoeur said.

"People who buy key-to-disk systems are not moving dramatically away from data entry, but they do want additional capabilities such as inquiry retrieval, and transaction-oriented processing," he said. "But volume data entry applications are still on the mainframes."

Jolicoeur noted that the trend toward transaction-oriented processing means distributing the data entry function and this trend toward distributed or dispersed processing requires small, less expensive and user programmable systems. That, he said, is where the newest MDS product will fit in.

"Our time has come to get aggressive again — to reassert the leadership in product and market development that characterized us in the past," Davidson stated.

"This time, our business plans are more precisely drawn; our market perceptions are more thoughtful and our products are geared to provide solid incremental improvements over competitive equipment," he said.

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Contracts

Computer Network Corp. has received a \$20 million contract from the U.S. Environmental Protection Agency to provide computer resources, telecommunications, and user support for their agency-wide DP requirements.

Computer Sciences Corp. (CSC) has been awarded a \$12.5 million, five-year contract from American Reserve Corp. of Chicago. The contract calls for CSC to supply management, technical staff and equipment for American Reserve's insurance subsidiaries.

Digital Resources Corp. has received a 30-month, \$8.4 million contract from Sonatrach, the Algerian National Oil Co. The contract provides consulting, training and technical assistance services involving computer-based systems and applications, and software development.

Harris Corp. has received a \$7 million contract from Lockheed California Co. to provide computerized test equipment for maintaining 18 long-range patrol planes that Canada purchased from Lockheed in July.

Systems Engineering Laboratories, Inc. has signed a contract agreement with Leeds & Northrup Co. to supply computers for use in Leeds & Northrup's energy management equipment.

The City of New York has awarded a \$4 million contract to American Management Systems, Inc. for the implementation of computer-based budgeting, accounting and financial control systems.

Datatrol, Inc. has signed a \$1.5 million contract with Stix, Baer & Fuller, a St. Louis-based retail

chain, to install 963 Datatrol point-of-sale terminals in 11 stores located in Missouri, Kansas and Illinois.

Applied Digital Data Systems, Inc. (Addis) has signed an OEM agreement with STC Systems, Inc., a division of Storage Technology Corp., for the purchase by STC of 1,000 Addis teletypewriter-compatible terminals.

Control Data Corp. has been awarded a two-year, \$1.2 million contract from Logical Machine Corp. for the purchase of CDC 92451 and 92452 microprocessor-controlled OEM display terminals.

E-Systems, Inc. has received a \$3,861,550 contract from the Naval Electronic Systems Command for the continued production of AN/WSC-3 (Whiskey-3) satellite communications terminals.



Calcomp ATLS At 29 Sites

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) has installed 29 of its Automated Tape Libraries (ATL), according to Mike Canfield, product manager of systems.

Three systems are in Japan and one is in Canada, he said.

Its largest system is at the U.S. Army's Logistics Materiel Support Activity in St. Louis. It is 95.7 feet long and handles 8,319 reels of thin line tape, he said.

Canfield characterized this installation as capable of handling one trillion bits if all the tapes were 6,250 bit/in. That installation has one control unit, 16 storage modules and 16 mounting arms.

Average System

Calcomp's average system is one control unit, 12 storage modules and 19 mounting arms, he noted.

Customers generally examine the whole field of mass storage, including the IBM 3850, he said, but the price of the 3850 with one trillion bits is something like \$5 million.

Calcomp's ATL uses existing tape media and costs \$374,020 for a system with one control unit, 16 storage modules and 19 mounting arms, he said.

Some sites intend to install both a 3850 and an ATL, he added.

Consultative Selling Becoming Popular

By C.J. Kurtz

Special to Computerworld

The consultative selling approach is becoming increasingly popular in both hardware and service sectors of the computer industry.

Buyers of computer-related products or services should be aware of and interested in this trend for two reasons. First, they should know how to benefit from the willingness of some suppliers to provide much more than raw hardware or machine cycles.

Second, such knowledge can help them avoid some of the pitfalls involved in being oversold or misled by an overzealous salesman calling himself an "account consultant."

Most marketing people acknowledge three basic types of selling: service, negotiation and consultative.

Service refers to "order taking," the situation in which the buyer knows what he wants, usually from whom he wants it and what he is prepared to pay. The salesman's role is largely a cooperative one — accepting the order.

In the DP area, service selling is most often found in the area of telecommunications facilities, supplies or upgrades to installed equipment.

Negotiation selling is a step up the ladder, but carries its own particular problems from the point of view of the supplier.

Again, the customer usually knows what he wants and is often well aware of various competitive prices and service. In some cases,

negotiation selling is done on a one-to-one basis. In other situations, the buyer may look at several prospective vendors.

In any case, the seller's margin is lower because of competitive pressures. In many cases vendors are open to the "whipsaw" ploy, the approach by which a buyer uses one potential supplier to force concessions from another.

Customer Consultant

Consultative selling involves much more. Basically, the salesman assumes the role of a consultant to the customer, at least as far as his company's products or services are involved.

In turn, this means several things: the salesman must know much more about the client's industry, organization and needs; he must have a much better knowledge of his own products or services as well as those of major competitors; and he must become much more deeply involved in his client's organization and affairs, developing many more contacts and assuming a more professional approach.

Why the Move?

Why are so many companies moving to the consultative selling approach? There are several basic reasons.

First there are fewer real significant distinctions among products over time. For example, there are literally dozens of good packages for financial modeling, structural analysis or data base management. And there are scores of time-sharing companies, offering them.

One of the few ways to distinguish among their offerings is by the type of service they provide around the product itself.

Secondly, with so many competitors in the field, a vendor often finds himself facing a competitor who is bidding at a price well below his own cost. This often happens because the competitor has more resources than he can justify and is pricing on the basis that "some is better than none."

One way to overcome this problem is to sell "value-added" services which cannot be so easily compared to competitive offerings.

Solution to Turnover

Many companies in the field are subject to the problem of high turnover of good people. The best salesmen want to be more than "peddlers." Many good ones are frustrated by the lack of opportunity for professional growth. Giving them a chance to "consult" and to get more deeply involved with their clients often helps.

Competition from hundreds of small turnkey systems houses ready and able to handle full application projects is forcing many larger service bureaus to handle work on a similar basis.

And finally, the consultative selling approach helps to foster the growth of the overall market much faster than one which waits for the client to determine his own wants or needs and to come to a vendor for help.

Properly used, the consultative salesman can be a real help to a buyer. He will usually have a broader knowledge of DP, hopefully in the buyer's own in-

dustry as well as a much higher level of technical knowledge than the old-style salesman, and his external viewpoint will often be more objective than might be expected.

Vendor Use

How should a vendor use this type of salesman?

If you find a good one, here is a suggested approach. Ensure that (1) he's planning to be with his present company for more than a few months; (2) his company offers a reasonably broad range of services; (3) he has a reasonable understanding of both business and DP concepts and is not just a retreaded used car salesman.

Also make sure his quota is realistic and he can afford the time to develop his business with you gradually and is not forced to sell you anything to make an unrealistic quota; you set some basic ground rules with respect to meetings and he does his homework before trying to sell you anything; you introduce him around your company and give him freedom to talk to people other than the "time-sharing coordinator"; you are willing to listen to his ideas when they're properly prepared.

Factors to Consider

Above all, every time he suggests you consider a new product and service look for the following:

- Has he convinced you that you should do it? Are the costs/benefits clear?
- Has he presented the best of all reasonable alternatives? Make sure you have him tell you what alternatives he has considered along with the advantages and disadvantages of each.
- Has he convinced you his company can and will make it work? Look for a well-thought-out plan and references.

If he has convinced you of the above and the price seems realistic relative to the value of the service, don't haggle or give his ideas to a competitor simply to obtain a marginal price decrease. This ap-

proach will lose his respect for you and his credibility within his own company. You will lose in the long run.

Questions to Consider

Computer hardware and service companies not already committed to consultative selling should consider the approach very seriously.

Some of the questions they should ask before deciding whether or not to make the move are: "Do we have a reasonable number of products or services available?" If a company sells only one or a very small number of products, forget it.

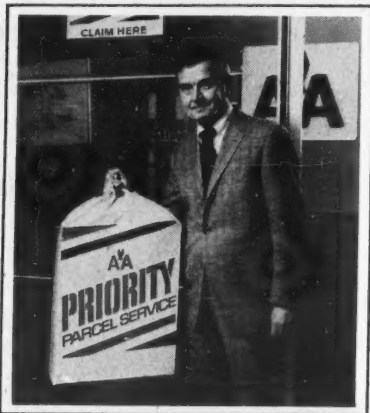
"Is our major aim long-term profitable growth?" If the answer is "yes," then the approach is realistic.

However, if a company is aiming for a short-term profit, the investment may be too great to accept.

"Is our senior management really prepared to accept and to become committed to the consultative selling approach?" If it is, then a company can safely take the approach. If management's attitude is to "let the troops try it out and if it works, join in," the answer is a resounding "no."

Kurtz is president of The Kappa Group, a consulting firm.

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BOEING COMPUTER SERVICES, INC.

Market for Cartography Systems Small But Growing

By Bill Cowan

Special to Computerworld

State, county and urban agencies should become the largest market for automated cartography applications within the next decade even though less than 10% of the agencies now utilize active systems.

At present, the agencies use fewer than 100 operational systems, but the number should increase to about 300 by 1980 and sustain an annual growth rate of 10% to 15% thereafter. The principal growth will be in the use of minicomputer-based interactive systems and in the further development of software programs.

"The reasons for the growth are the increasing convenience and cost-effectiveness of the minicomputer systems," according to Julius Dorfman, president of International Technology Marketing (ITM), a Massachusetts consulting firm that recently completed a major study of worldwide uses of automated cartography.

"We expect to see the systems being increasingly used in updating statistical data, providing maps for planning purposes including tax valuation uses and in supplying the maps needed for all types of utility distribution systems," he said.

Operational Systems

An experimental science until just a few years ago, automated cartography is increasingly becoming a cost-beneficial user application discipline.

According to an ITM report, "Computer Cartography: Worldwide Technology and Markets", 40 U.S. government agencies, primarily in the departments of Agriculture, Commerce, Defense, and the Interior, are most deeply involved with computerized mapping, charting and surveying. The total budget for the agencies is in the \$300 million to \$350 million range.

As yet, only a few states, principally

Arizona, California and Colorado, have operational systems because of the lack of adequate data bases, funding and expertise.

Industry, with a few exceptions, has been relatively slow to adopt automated cartography. The exceptions are the oil and gas exploration companies, several of which (Amoco, Exxon, Standard Oil of California) have large computer-based systems in which the data bases reside and satellite minicomputer systems.

Several utilities (Brooklyn Union Gas, Houston Natural Gas and San Diego Gas & Electric) have operational systems, as do a number of engineering construction firms. As new major pipeline projects develop, automated cartography systems should come into greater use, limited by the tasks of developing the comprehensive data bases and information systems needed for the projects.

U.S. Not Leader

In spite of American progress with the new technology, some experts believe the U.S. is not the leader in automated cartography development.

Canada is probably the leader in the field because of government commitment for more than the last 10 years and the high level of development work at Canadian universities and government agencies.

Canada has had great success with software and data base development for use in demographic, agricultural, natural resources and other applications of national interest.

Worldwide Interest

Interest in the applications of automated cartography is worldwide. At least 15 European nations have programs in various stages of development ranging from the experimental to the operational.

Mexico, Brazil and Venezuela also have projects under development, most of them sponsored by the federal governments and universities.

According to ITM, the technology for further effective use of automated cartography is already available, particularly in interactive minicomputer systems, large batch or on-line systems and application

software.

Areas requiring further general applications development are data reduction and management, digital-to-vector conversion, more effective application software and in improved and lower cost output devices. The major task for the individual user is the development and operation of the specific data base required.

Expansions

Interdata, Inc. has moved its Monmouth County operations to a larger facility at 106 Apple St., Tinton Falls, N.J.

Four-Phase Systems has begun construction of a manufacturing and administrative complex at the intersection of De Anza Blvd. and Interstate 280, Cupertino, Calif.

On-Line Business Systems, Inc. has moved to larger headquarters at 115 Sansome St., San Francisco.

NCR Corp. has opened a data center in Columbia, Md., to provide service for customers in the Baltimore, Washington, D.C., and northern Virginia area.

TEC, Inc. has begun building a 75,000 sq-ft manufacturing addition adjacent to its current facility in Tucson.

Accusort Systems, Inc. has purchased land for a 10,000 sq-ft building to be erected on 10 acres in Telford, Pa., near its present plant.

Continental Leasing Co., Inc. has relocated its Metuchen, N.J., office to Scotch Plains, N.J., at 8475 Jerusalem Road.

Computer Sciences Corp. has begun con-

struction on a 66,000 sq-ft office building in the International Center, an industrial park in El Segundo, Calif., close to Los Angeles International Airport.

Complete Business Services, Inc. has occupied 875 sq ft of office space at 9540 S. La Cienega Blvd., Inglewood, Calif.

Epicom, Inc. has opened new facilities on Douglas Road in Altamonte Springs, Fla.

Sycor International Ltd., a wholly owned subsidiary of Sycor, Inc., is opening a logistics and repair depot in Toronto at 3440 Pharmacy Ave. in Scarborough.

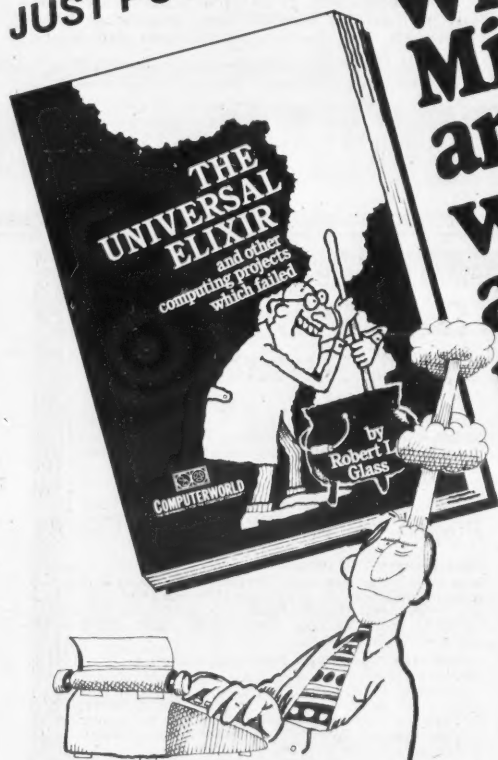
IBM is building a replacement plant for the Bedford-Stuyvesant section of Brooklyn.

Data Rentals/Sales, Inc., has agreed to purchase a 17,000 sq-ft building at 8611 Hayden Place, Culver City, Calif.

Analogic Corp. is scheduled to begin construction on an 8,000 sq-ft plant addition on Audubon Road, Wakefield, Mass.

Zilog has moved to its new 32,000 sq-ft facility at 10460 Bubb Road, Cupertino, Calif.

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- The Sandbagged Computer Selection
- Turning the Empire State Building into a Church

PLUS (as if anyone cared) "Miles Benson" reveals the man behind the name—the true devotee of disaster and author of this entertaining, instructive—(and occasionally frightening)—book.

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IBM Calls Honeywell Sales Force Strongest of Any Competitor in '66

By Molly Upton
Of the CW Staff

NEW YORK — IBM market analysts pinpointed Honeywell's sales force as the strongest of any of its competitors in 1966.

In a report prepared for management and entered into evidence in the U.S. vs. IBM antitrust trial here, IBM market researchers showed respect for Honeywell's ability to replace IBM machines with Honeywell offerings.

"The Honeywell field organization should be considered as one which gets maximum mileage out of the hardware and software they have to sell. They are aggressive salesmen who probe for weaknesses and, once found, take full advantage," the report said.

"In pure sales ability, they rank No. 1 of all IBM's competitors," the report acknowledged.

The IBM report expected Honeywell to "develop the strengths which will allow Honeywell to compete more vigorously with the position of IBM as a supplier of industry knowledge and problem-solving ability.

"They are off to a running start in this respect as is evidenced by their industry-oriented organizational structures," the report stated.

Success Cited

IBM cited Honeywell's success, with over 1,500 series 200s installed, which it said was based on a 1401-like product and the Honeywell "Liberator" and, more importantly, on aggressive salesmanship.

Although the IBM 360 had negated the H200 price/performance advantage, orders for the Honeywell product remained at a fairly high level, IBM indicated.

Honeywell's sales force was capitalizing on prompt delivery and advantages of its tape system.

It emphasized that it — not IBM — offered 16K Cobol for the 200 and 8K Fortran for the H120, according to the report.

IBM was not totally convinced of the merits of the Honeywell system. The report said Honeywell marketing was able to "successfully sell around IBM's ex-

clusive features which would be of value to the customer."

In other words, the Honeywell features didn't really offer all that it claimed, according to IBM.

Deriding Honeywell's 8K Cobol for the 120, it remarked "that this is an extremely restricted version and [the fact] that 360 RPG is superior does not offset the appeal of Cobol."

Although the Liberator package was not everything it was billed to be, "customers were and are generally satisfied with the results gained," IBM said.

The Honeywell marketing organization was particularly adept at ferreting out unhappy IBM accounts, the report observed.

About 67% of IBM's accounts lost to Honeywell were for sales coverage and delivery and an additional 9% were lost because of price/performance, according to the IBM report.

Honeywell would be even stronger in the future because it was developing application/systems knowledge through its IBM-like industry-oriented organization.

IBM expected Honeywell to enhance the 200 series where necessary and announce a low-end entry below the 120 as well as to put more emphasis on the inter-

mediate market as systems/application knowledge increased.

Profits Estimated

IBM estimated Honeywell's net profits from computers in 1969 would top \$50 million or about one-third of the total corporate net before taxes.

Honeywell shipments for both the DP and Computer Control Division between 1966 and 1970 would be about \$300 million, according to IBM.

This figure would not be higher because of Honeywell's need for capital to support its rising rental base, it noted.

Honeywell, the report observed, was directing its commercial computer sales toward a market that was "overwhelmingly rental-prone."

IBM predicted Honeywell would wait until pioneering work on time-sharing was done by others and would then enter that market.

IBM Trial Documents

Conference Set

MONTVALE, N.J. — The Association of Data Processing Service Organizations (Adapso) will hold its 46th Management Conference in Washington, D.C., on April 20-22 at the Hyatt Regency.

The three-day conference will include sessions on selling to the government, affirmative action programs and the economic climate for small business.

In addition, there will be sessions on state taxation of computer services, opportunities in the minicomputer business, international markets, electronic funds transfer and customer software.

Adapso is at 210 Summit Ave., Montvale, N.J. 07645.

Acquisitions

Selecterm, Inc. has acquired the assets of the Washington, D.C., operation of Worldcom, Inc., Dallas, Texas. Selecterm will offer financial and service programs for data terminals in the Washington, D.C.-Baltimore area.

Atlee Corp. has acquired the assets of Printer Technology, Inc., now called the Printec Co. Printec obtained the manufacturing rights and spare parts business to the Printec 100 and 100M, a high-speed multiple-copy impact printer.

Centronics Data Computer Corp. has announced the termination of discussions regarding the acquisition of Data Printer Corp. of Cambridge, Mass.

Intel Corp. has agreed to acquire Utility Network of America, Inc. Terms of the agreement call for the exchange of .85 shares of Intel common stock for each share of Utility Network.

Datapoint Corp. has agreed in principle to acquire Amcomp, Inc., a manufacturer of tape and disk drives. The purchase price will be an amount in cash equal to the shareholders' equity of Amcomp on Oct. 31, 1976.

POSITION ANNOUNCEMENTS

IMS/Vs SPECIALISTS

FEDERAL RESERVE BANK OF SAN FRANCISCO

Join a team of experienced professionals on an IMS/Vs DB/DC installation in a progressive, MVS/MP environment. Immediate openings in the following areas:

IMS SOFTWARE SPECIALISTS

Experienced IMS systems programmers needed to install and maintain IMS/Vs DP/DC 1.1.3 with VTAM/NCP. Minimum 2 yrs. exp. in IMS software/externals required.

IMS DATA BASE SPECIALISTS

Experienced data base design specialists to establish DBA group. Minimum 2 yrs. exp. in IMS data base design and IMS applications support required.

Competitive salaries, excellent fringe benefits. Please send resume and salary requirements, in confidence, to Pat Powell, FEDERAL RESERVE BANK OF SAN FRANCISCO, 400 Sansome, San Francisco, CA 94120. An equal opportunity employer M/F/H.

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DATA PROCESSING PROFESSIONALS...

Explore the long-term career-oriented program Cutler-Williams has formulated to retain the services of the "True Data Processing Professional".

We offer:

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It's very simple, we have enough work to keep our staff productive for years. We are doubling our national staff in 1977 and are expanding to several new cities. We have openings in marketing, recruiting and a majority of our needs are:

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2. CICS/COBOL/DL-1
3. OS/DOS COBOL/BAL
4. Variety of Other Hardware

Now is the time to find out where you fit into our long range plans. Offices now in Los Angeles, San Francisco, Dearborn, Chicago, Dayton, Miami, Houston and Corporate Office, Dallas, Texas. Expanding soon to Philadelphia, Washington, D.C., Denver and Seattle.



Jerry Beatty
Director Corporate Recruiting
(800) 527-4907 Toll Free
Contact Local Office
or Forward Resume
Cutler-Williams, Inc.
2655 Villa Creek Dr., Suite 205
Dallas, Texas 75234
equal opportunity employer

A LOT OF TALENTED PEOPLE HELPED MAKE DATA PROCESSING BIG AT AETNA. JOIN THEM.

Aetna Life & Casualty, world's leading insurance and financial services organization, has one of the most sophisticated IBM installations anywhere at its Hartford Connecticut headquarters. Each of its operating divisions is seeking experienced programmer/analysts who want to challenge and be challenged.

LIFE DIVISION

New development projects require immediate staffing for several applications groups. Analytical skills plus 2-5 years COBOL programming in large scale IBM environment a must.

CASUALTY DIVISION

SAFARI, our pioneering policy writing system continues to grow and claim processing and commercial lines development. We're also developing a new auto billing system, an advanced Expense Information System, along with information systems and models to improve the planning process.

GROUP DIVISION

Join an application development team. Assignments include new on-line and batch development projects for insurance systems. Also maintenance of existing systems. We need applications programmers with 1-4 years experience using ANS, COBOL, JCL, O/F. On-line and data base applications background desirable.

In all these positions continued personal development is possible though on the job and formal technical and managerial education programs. If you're interested send us your resume and salary requirements. Write: V. Allingham, Employment Office, Aetna Life & Casualty Hartford, CT 06156. An equal opportunity employer.

Data Processing at Amtrak!

Amtrak's programs require the development of new systems to support FINANCIAL, OPERATIONAL, ENGINEERING, and RESERVATION functions of a nationwide corporation. We are adding senior and mid-level personnel who qualify for the following:

Real Time Communications Programmers

Requires on-line experience for systems development in Assembler language, maintenance, program testing, and the installation of CDC and PDP equipment.

Programmer & Programmer/Analyst

Requires extensive experience in the design and implementation of applications in an IBM OS/MVT or VS environment using MARK IV, COBOL, FORTRAN, TSO, IMS, IBM 3790 programming helpful.

Operations Production Technical Support

Requires 1-2 years experience in coding and debugging IBM 360/370 OS JCL, analysis and resolution of production abends, OS utilities, operations documentation review and turnover. Knowledge of MVS, TSO and hands-on computer operations helpful.

Systems Programmer

Requires experience in such areas as: MVS, JES II, TSO/TCAM, VTAM/NCP, VSAM, IMS, and multiple languages, including ALC, COBOL, FORTRAN OR MARK IV. Must possess ability to provide fast problem resolution, analyze and interpret performance data, recommend and develop standards.

We offer excellent salaries, benefits, and growth opportunities. Send resume including salary history in strict confidence to:



J.R. Brune, Personnel
AMTRAK
955 L'Enfant Plaza SW
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BUSINESS
SYSTEMS ANALYST

MAJOR SOUTHERN BASED MANUFACTURING CO
SEEKING KEY PEOPLE FOR UPCOMING PROJECTS...

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- Inventory Control
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- Minimum Requirements Include:
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 - State of the Art Exp Preferred
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WILL CONDUCT FEASIBILITY AND DETERMINE USER REQUIREMENTS, DETAIL DESIGN & TRAIN USERS. CANDIDATES NEEDED WITH VARYING LEVELS OF EXP. COMPETITIVE SALARIES, WELL DEFINED CAREER PATH, ESTABLISHED IN-HOUSE TRAINING AND EXCELLENT FRINGES.

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TASKFORCE, INC. EMPLOYMENT CONSULTANTS
P.O. BOX 6888
GREENSBORO, N.C. 27405
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Telecommunications Systems Analyst

Experienced mini-computer Programmer Analyst to provide file and queuing management analysis and design for new message switching network using packet switching techniques. Requires experience in programming mini-computers at Assembly language level. Familiar with operating hardware systems.

Qualified applicants desiring a permanent position in a highly professional environment at our New York City headquarters are invited to send resume with salary requirements to Mr. Charles Doughty, Employment Office.

**ITT Domestic Transmission
Systems, Inc.**
COM-PAK

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WANTED:

Hardware/software experts to help build new computers to match the world's best software.

Telefile Computer Products, Inc., the only supplier of new peripherals and main memory for Xerox computer users, is embarking on a new challenge.

The development of two new Sigma computers. They will extend the line's capabilities well into the 1980's and take full advantage of Xerox' state-of-the-art CP-V and CP-R operating systems... software that the latest Datapro Research survey shows as ranking first in the world.

Sigma 9 computer

- Will be micro-programmed
- Schottky MSI circuitry
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- Full production by 12-78

Sigma 11 computer

- 4 X faster than present Σ9
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All standard Telefile and Xerox I/O processors, main memory, and peripherals will be plug compatible with both machines.

Telefile, located in the heart of California's sun-filled, dynamic Orange Coast, is staffing up now and needs these highly skilled professionals to help:

- CP-V and CP-R Development Programmers
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- CP-V and CP-R Analysts
- Firmware Designers
- Comp. Architecture Designers
- Semi and Core Memory Designers
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Only highly qualified applicants need apply for this exciting new venture with a computer company that has shown an average annual growth of over 50% five years in a row. Send resume and salary history to:

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Telefile Computer Products, Inc.
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Telefile

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*Computerworld, December 6, 1976

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EXEC 8, Communications, U-1100 Series. (Will be working on 1100/80.) Excellent Benefits, Top Salary, State-of-the-art environment. Openings in New Jersey. Need IBM, UNIVAC, HONEYWELL, etc., COBOL experience in Atlanta office. Send resume in confidence to:

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(404) 458-2371

Data Processing

Large Scale IBM Challenges

Our clients' growing need for professionals has created these exciting career opportunities with major corporations at attractive Mid-west locations.

DP Manager	\$35-45
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These genuine growth opportunities require IBM experience and offer excellent benefit packages that include all relocation fees. Send resume to:

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797 Washington St.
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UNIVERSITIES AND POLYTECHNIC COMPUTER CENTRE

Applications are invited
for the post of
MANAGER

The Centre, jointly owned by the three tertiary level educational bodies in Hong Kong (The University of Hong Kong, The Chinese University of Hong Kong and the Hong Kong Polytechnic), provides a comprehensive computer service to its member institutions. Computer systems installed include a central ICL 1904A at the UPCC site, ICL 1902T at HKU, IBM 370/125 at CUHK, and PDP 11/70 and NOVA 3/12 at HKP.

The Manager is responsible for the full operation of the Centre in accordance with policies set down by the Board of Management and/or its Committees. He will report to a 'Steering Committee' consisting of a representative from each of the member institutions.

Applicants should possess proven experience at a senior level in the management of an educational computer installation.

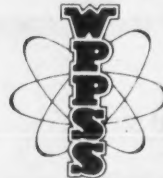
Appointment will be made on the scale HK\$7145 to HK\$9625 per month. [£1 = approx. 8HK\$, 1 U.S. = approx. 4.8HK\$] Starting salary will be commensurate with qualifications and experience. Appointment initially will be on 2-year gratuity-bearing terms. The appointee may be offered a renewal of the contract or permanent terms of service thereafter. Benefits include passages, long leave, quarters, medical care, education allowance and a terminal gratuity equal to 25% of basic salary received over the contract period.

Letter of application, giving the names and address of three referees, together with full resumes, should be forwarded to the Director, UPCC, c/o Secretary's Office, Hong Kong University, Hong Kong, not later than three weeks from the appearance of this advertisement.

SYSTEMS ANALYST

We have immediate openings for Systems Analysts with business applications experience. Responsibilities include preparation of requirements, specifications, and detailed designs (programmable) associated with the implementation of business application systems.

The successful candidates will possess a degree, plus a minimum of three years of directly related professional experience.



We are a major Pacific Northwest utility agency with work in progress on five nuclear power plants. We are located in an inland Pacific Northwest community of approximately 90,000. Comprehensive fringe benefit package, including relocation assistance.

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Think About Tomorrow, Today

We are an expanding retail concern whose continued growth provides excellent opportunities for the right individuals to create tomorrow's data processing techniques today.

The successful candidates will have 5 years plus experience in pure systems design, with a proven track record in the merchandising field. The areas of responsibility will include all new development as well as re-optimization of our existing systems. Experience in the financial area in data base are a definite plus.

We offer a comprehensive benefit program, company paid relocation, excellent starting salary plus the advantages of living in middle Tennessee.

Send resume including salary history and requirements to: Mr. Lee Arnold, Assistant Director Data Processing.

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REAL TIME / MINI COMPUTER PROGRAMMERS

Honeywell Commercial Division, a world leader in the design, application and manufacture of automation systems, seeks several Programmer Analysts and Senior Programmer Analysts to take on responsibilities in the design of programs for their computer control systems.

Qualified candidates will have 4 or more years experience in real time assembly type programming, mini-computers and micro processors. Additional experience with distributed intelligence systems design or a background on a Motorola 6800 is a valuable plus. Especially talented individuals with 7 or more years experience in these areas will be considered as candidates for positions as Senior Programmer Analysts.

If you seek an outstanding salary, excellent benefits, rapid advancement and an opportunity to join a strong progressive company, send your resume in confidence to: Staffing Administrator, HONEYWELL, 1500 West Dundee Road, Arlington Heights, Illinois 60004.

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Computer Professionals

Most computer professionals are aware that today's most advanced large-system technology was developed by a company that, not too long ago, was virtually unknown. For five years the industry heard rumors of a small, crack team of computer designers in Northern California working on a new generation of high-end, high-performance computers. But, most didn't put much stock in the rumors until, in mid-1975, the first multi-million-dollar system was up and running at the first customer site.

Now the phenomenon of Amdahl is well-known in the industry. The 470V/6 performs as promised. (It is, in fact, the world's price-performance leader.) The company performs as promised. (Amdahl hardware and software support exceeds established standards.)

Consequently, by the end of 1976, over 30 systems valued at more than \$125,000,000 were operating within prestigious organizations in the U.S., Canada and Europe. Two-thirds of that 18-month installed base were shipped during the last six months of 1976.

Not widely known, however, is that this "unknown" which suddenly became a major supplier of large systems is still, in terms of staff size, a relatively small company. The kind of company, we believe, where creative, enthusiastic people like to work. It took a lot of creativity and enthusiasm (and hard work that we enjoyed because it was fun) to do what we have done. When we began, we intentionally created a friendly environment where individual efforts are recognized. We're still that way, and we need others like us to stay that way. At Amdahl, you're not lost in a sea of people: we started out 1976 with less than 400 people, and ended with less than 800. There's still room on the ground floor.

We're looking for above-average talent. You can expect an above-average compensation and benefits package. Please direct your response to Manager, Professional Employment, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, California 94086. To expedite your application, please indicate on your resume or letter the response number contained in the text of the position offering. We are, of course, an equal opportunity employer.

COMPUTER SYSTEM ARCHITECT

You will be the performance specialist on an architecture team developing future systems. You should have broad knowledge of computer system performance measurement and evaluation with emphasis on architecture. You are competent in several of these areas: computer system organizations; storage system organizations; programming; operating systems practice and theory; and data base/communication fundamentals. PhD in computer science or related field helpful. Please indicate 4161-E on your response.

SENIOR PRODUCT PLANNER

Dynamic professional for our architecture and product planning department. You will play an important role in shaping product strategies as well as the deduction, evaluation and establishment of requirements for future products.

You should have an outstanding record of achievement in large-scale, commercial computer planning for both use and development; demonstrable success in both line and staff management assignments; and a thorough knowledge of both hardware and software architecture. Please indicate 416-E on your response.

COMPUTER PERFORMANCE MEASUREMENT/EVALUATION ENGINEER

You will develop and apply analytical and simulation models and measurement facilities/techniques to support the development of current and future systems. You should have 2-5 years' experience in performance measurement and evaluation. Please indicate 4162-E on your response.

ENGINEERING MANAGER: COMPONENTS/RELIABILITY

You will manage a group involved in IC and electrical component selection, application, specification, evaluation, qualification, and failure analysis. You will also involve yourself in computer system MTBF predictions and MTBF enhancement responsibilities. BSEE or physics degree, 5 years' engineering experience and several years of management experience. Please indicate 4112-E on your response.

SEMICONDUCTOR COMPONENT ENGINEER

You will be involved in the selection, application, specification, evaluation and failure analysis of discrete and integrated semiconductor and passive components used in the 470V/6. You have a minimum of 3 years' experience in IC component design or test, and characterization of complex IC components. BSEE, MSEE or physics degree. Please indicate 4111-E on your response.

SENIOR MANUFACTURING ENGINEER

You will manage a small group of manufacturing engineers engaged in technical support for the assembly of the 470V/6 main computer system. You are experienced in PCB assembly and flow solder; general electro-mechanical assembly; wire wrap; metal fabrication, and assembly jig and fixture design and fabrication. You will also find it useful to have experience in semiconductor manufacturing; project management for electro-mechanical equipment development, including critical path management techniques, and knowledge of software techniques. BSME, MSEE, or MSIE with 7-10 years' industrial experience. Please indicate 6503-E on your response.

STAFF MANUFACTURING ENGINEER

You will provide technical support for the assembly operation of 470V/6 multiple chip carrier technology. You will determine and implement tooling; process development and control, and provide engineering liaison. It will be useful to you to have semiconductor processing experience, including gold ball bonding or reflow soldering. BSME, BSIE with 3-5 years' industrial experience. Please indicate 6504-E on your response.

MANUFACTURING SYSTEMS ANALYST

You will develop and implement data management systems for manufacturing. You have outstanding communications skills and a proven record of your capability to undertake project responsibility. You will provide user training and interact with applications programming. You have a detailed working knowledge of manufacturing systems, MRP, shop floor control, and cost accounting. Degree in business administration or computer sciences. Please indicate 6505-E on your response.

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There's Still Room on the Ground Floor at Amdahl

FIELD ENGINEERS

Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

You will carry the Amdahl philosophy of customer service as well as your expertise into the field, utilizing your initiative and talents to aid the customer in restoring computer center operations regardless of the origin of the failure. Large system experience essential, preferably on compatible equipment. Please indicate 560-E on your response.

FIELD ENGINEERS: TEMPORARY DUTY IN EUROPE

Immediate openings for field engineers to work at Amdahl installations in Europe as an initial assignment. You will join the permanent field engineering staff, with your first assignment being approximately six months in Europe. Same qualifications as stated elsewhere in this ad for field engineers. Please indicate 905-E/Europe on your response.

FIELD SYSTEM PROGRAMMERS

We are generating constant field openings in concert with the rate at which 470V/6 shipments are growing. We need individuals with both the attitude and aptitude to carry our enthusiasm for unparalleled software support into the field. Immediate opportunities exist throughout U.S. and Canada.

You should have a need to feel useful to Amdahl users in a mixed-vendor environment and have a propensity for exuding the Amdahl enthusiasm. You must have a firm grasp on software systems, in-depth knowledge of large system internals (OS/MVT, VM, VS2, SVS, or MVS) and excellent diagnostic ability. Please indicate 362-E on your response.

Please see far left column, opposite page, for response instructions.

TEST ENGINEER

You will be responsible for manufacturing test, solving test correlation problems and implementing corrective action to improve any deficiencies. You are experienced in analyzing circuits, determining test requirements, and implementing test procedures and methods. BSEE with 5 years' experience in PCB and sub-system engineering using computer controlled automatic test equipment. Please indicate 6501-E on your response.

TEST EQUIPMENT ENGINEER

You will be responsible for the selection or design and development of sophisticated, computer controlled and electro-mechanical test equipment. BSEE or equivalent with a minimum 5 years' experience. Please indicate 6502-E on your response.

Positions offered in this advertisement represent immediate openings only. If you have any talents that you believe could be exercised in the exciting Amdahl environment, please feel free to write us.

MARKETING ANALYSTS/PLANNERS

You will become an integral part of Amdahl's market planning department in developing on-going product and marketing strategies. You will not be working in a vacuum, nor merely generating raw data, but rather playing a recognizable part in shaping future programs. You should have a college degree as well as skills in one or more of the areas below. Please indicate 373-E on your response

Product Analysis

You will investigate, analyze and develop scenarios describing future performance levels and functions/features of competitive computer systems. Computer hardware engineering and analysis skills, and knowledge of the architecture and organization of large-scale, IBM-compatible computer systems are required. Familiarity with software aspects desirable.

Pricing, Terms & Conditions Analysis

You will monitor and analyze competitive contract terms, conditions and pricing structures, and develop appropriate scenarios. Financial and contract analysis skills required. MBA helpful.

Market Research

You will develop and coordinate on-going

market research projects entailing the characteristics and attitudes of Amdahl's prospects and customers. You will also monitor, acquire and analyze research reports generated by outside vendors. Statistical analysis skills necessary.

Forecasting & Model Development

You will develop and continually define analytical models describing the important aspects of Amdahl's market situation and use these models to generate forecasts that evaluate market strategies. Operations research skills required.

PROFESSIONAL LARGE-SCALE COMPUTER SYSTEMS SALES

You are the right candidate for this opportunity if you do not *have* to make a move; if you are currently leading your peers in competence, enthusiasm and performance, and if you have a need to be on a winning team selling the better product. You will have a thorough knowledge of the large-scale computer marketplace, and a five-year performance record. You will enjoy the personal and professional satisfaction of selling the proven price-performance leader, and enthusiastically relating the Amdahl success story to a wide audience that is anxious to hear the details. In addition, you will enjoy an extremely attractive income, incentive and benefits package. Immediate openings exist in our Eastern Division, headquartered in New York City. Please indicate 310-E on your response.

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PROGRAMMERS ANALYST/PROGRAMMERS

PROJECT MANAGER:

Experience in the Design and Analysis of materials management systems, or accounting information systems, or customer information systems. Current or previous experience in COBOL programming in a 360/370 large scale OS environment.

SYSTEMS REP:

Systems design and analysis of materials management systems, accounting systems, current skills in COBOL-ALG programming of large scale 360/370 OS systems.

DATA BASE SPECIALIST:

Experience in OS IMS on-line communications systems.

SR. PROGRAMMERS:

Experience in design and development of OS/COBOL programs for large scale 360/370 systems. Application areas are materials management, accounting, and customer information.

ANALYST PROGRAMMERS:

Experience in the design and implementation of VSAM files for OS 360/370 systems.

Experience in the utilities industry is very desirable. We can offer excellent professional growth, with advancement on merit. Complete benefits program and above average compensation.

Please call or forward resume to Cliff Taylor (214) 233-4341

TRES Computer Systems, Inc.

4255 LBJ Freeway, Suite 220

Dallas, Texas 74234

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no agency's please

PROGRAMMERS SYSTEMS ANALYSTS

Our client company has many openings for programmer analysts, systems analysts, sales and marketing representatives, systems engineers, technical representatives, and project managers. This is a growing, prestigious, progressive company. Top dollar. Company pays the fee.

Please call or send resume to our EDP specialists

WOLF ASSOCIATES

(201) 688-8700

324 Chestnut Street

Union, New Jersey 07083

SYSTEMS ANALYSTS

New Engl clients expanding dev. staffs. Openings exist for COBOL trained indiv's who have systems design potential & related "User contact" skills. Many positions lead to project leader/mgr resp. Salaries to \$20,000. Contact Stan Durbas

ROBERT HALF
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111 Pearl St.

Hartford, Conn 06103

(203) 278-7170

SYSTEMS PROGRAMMER

IMMEDIATE OPENING

The Michigan Mining Division of The Cleveland-Cliffs Iron Company is seeking a qualified programmer to become responsible for the generation and maintenance of the company's S/370 138 DOS/VS CICS TP and batch system control programs.

Qualified applicants will possess a minimum of 2 years experience in software programming & maintenance and a degree in a computer related university curriculum. Additional experience will be considered in lieu of the degree. DOS/VS CICS competence is strongly desired.

An excellent competitive salary and a comprehensive benefit program will be enjoyed by the successful candidate. If you meet the qualifications described above, you are invited to submit resume with salary history and requirements in strict confidence to: W.F. CLARKE

The Cleveland-Cliffs Iron Co.

504 Spruce St., Ishpeming, Mich. 49849

An Equal Opportunity Employer (M/F)

NEW YEAR NEW CAREER OPPORTUNITIES

Do you feel that you have limited promotional opportunities at your present place of employment? If your talents have passed your organization by and you can not achieve the personal growth you expect, then consider the following:

One of the largest financial institutions in the Mid Atlantic area is presently expanding its Data Processing organization. As a result, you can now become a member of a Data Processing team where the accent is on professionalism, performance, and promotability.

Our formal Career Development Program is unique in the industry and will provide you with the opportunity to establish goals and objectives realistic to you and management. Below are just several positions which will afford the successful applicant the career potential he or she is looking for. IBM background is required.

SOFTWARE SYSTEMS MANAGER

The successful candidate will be responsible for the Systems Programming, Data Base Design, and Data Communications sections. Systems Programming management experience in an IBM environment is necessary.

APPLICATION SYSTEMS MANAGER

Manager of a 20+ staff with responsibility for all Commercial Systems Applications, for example, mortgages, commercial lending, international, etc. The candidate must have strong systems background and good management experience.

DATA BASE ADMINISTRATION

Experience preferably in Data Base Administration or secondary applicational use of Data Base in an IBM large system. OS/VS environment. COBOL and ALC desirable and TP background with package experience with CICS, IMS/DC or Inter Com.

PROJECT MANAGERS

The candidate must have a good strong systems background, Project Managing experience, and the ability to bring large on-line systems in on schedule.

ANALYSTS

Analysts are needed for advanced systems projects, DDA, Savings, Commercial Loan, Mortgage Loan, and Credit Card. A candidate should have a minimum of 3 years' experience as an Analyst and a good knowledge of Commercial Loan Applications. COBOL on IBM preferred with Data Com and Data Base helpful.

SENIOR PROGRAMMERS

Minimum 4 years' programming experience necessary and COBOL environment essential. IBM/ALC experience desirable.

PRODUCTION PLANNING MANAGER

The candidate will be responsible for planning, scheduling, and organizing the most efficient use of the computer systems to allow timely production of computer generated reports. He or she will assist the Divisional Training Director in developing and administering training programs for E.D.P. Operations, as well as evaluating proposed and changed applicational systems prior to implementation.

PRODUCTION CONTROL MANAGER

This individual will assure an accurate and efficient flow of data input and output between the various user departments and Data Processing as well as having budgetary, security purchasing and supervisory responsibilities.

TELECOMMUNICATIONS ANALYST

The individual will be responsible for installing and maintaining communications networks and the coordination with carriers, equipment vendors, user departments, software analysts and computer operations for installation and network maintenance. He or she will perform administrative duties such as documentation preparation, preparation of trouble analysis and availability reports and billing audit and distribution as well as conducting systems feasibility design and implementation studies concerning communications systems.

Representatives of this institution will be available for interviewing purposes at various locations throughout the country over the next several weeks. Even if you're satisfied with your present position, we encourage you to spend a few minutes with us and review our exciting plans for the future.

All of these positions provide an excellent salary and benefits package. Please submit a resume or brief letter of inquiry to:

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DATA BASE SPECIALIST -BIDS

Puritan-Bennett Corp., a well established national manufacturer and distributor of respiratory equipment and anesthetic gases, has an outstanding opportunity for an experienced Systems Analyst with experience in data base systems design. The individual selected will be responsible for designing and developing a new manufacturing data base application.

Qualified candidates must have extensive experience with HIS-IDS at design and programming levels. Teleprocessing/manufacturing background is desirable.

We offer an excellent benefit package including relocation assistance to the Kansas City area. For immediate consideration, send resume and salary history in confidence to: F.E. Stowell, Corporate Personnel Manager.

PURITAN BENNETT CORP.

13th & Oak

Kansas City, MO 64106

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ASSOCIATE DIRECTOR INFORMATION SYSTEMS

Incumbent will report to the Director of Information Systems and be in charge of the Computing Resources Management Group. Major responsibilities will be to direct the analysis and preparation of budget requests for computing support of a 19 campus education system; the identification of computing requirements for preparation of a system-wide master plan; the review and evaluation of hardware, software and facility resources and staffing patterns; the follow-up on audit recommendations for resource utilization; and the administration and management of a complex procurement process. Incumbent will supervise a small technical and professional staff and confer and consult with system-wide planning groups and officials of other state agencies.

Requires a BA degree and 5 years experience, 2 at the management level, in a complex computing facility with a batch and time sharing operation including procurement responsibilities and working with vendors. Knowledge of current computer technology and its applications for solving computer support requirements. Knowledge of cost/benefit analysis and budgeting. The ability to resolve resource allocation problems and communicate effectively with other management personnel.

The salary range is \$26,220 to \$31,692 and resumes should be directed to OFFICE OF CHANCELLOR. NO PHONE CALLS PLEASE.



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Personnel Services, Ref. #1913

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Duties involve the sale of Data Entry Equipment or our new 7600 Data Collection Terminal. These positions require a minimum of 3 years' experience in the sale of mini computers, mainframes or related peripherals.

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Interested applicants should send resume, including salary and commission history to:

Pual Salerno

MSI

DATA CORPORATION

340 Fischer Ave.
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**TECHNICAL SUPPORT SPECIALIST
With S&L Processor**

New position just opened for the data systems support "Pro".

To qualify, you must be able to provide: Hardware/software technical support in real-time, on-line communications oriented systems. "Hands-on" experience with minicomputers, integration of hardware and equipment operations. Designing, evaluation, implementation and maintenance of data communications software, evaluation, selection and installation of computer hardware.

If you want to be considered for this position, send your resume, with background, and salary history, in confidence to:

Al Jordan
MATERIAL SERVICE CORP.

300 W. Washington St.
Chicago, Illinois 60606

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PROGRAMMER • ANALYST

A nationally known corporation with divisional headquarters in the Chicago area has expansion positions open in Data Processing.

These positions require 3 to 5 years experience in heavy manufacturing systems with a knowledge of an assembler level language. Additional languages and teleprocessing experience will be a plus.

Salary commensurate with experience, plus outstanding fringe benefits, excellent location and working conditions.

Reply by sending resume with salary history to:

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WYMAN GORDON CO.

Midwest Division
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Softwr Speclst (O/S or IMS) \$22/32M

Univac Speclst (1108) \$17-28M

Data Base Prog/Analyst \$22-28M

Mfg Prog/Analyst \$20/25M

APL Programmer \$17/22M

On-Line BAL Prog/Analyst \$18/22M

Cobol Appictn Prog \$16/22M

If you fit any of these requiremts, or would like to explore other oppty's, we would be pleased to receive a call or resume from you in complete confidence.

J.P. Sullivan, VP:

marc nichols

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This company is a leader in its field of specialized insurance and is forming a new department to design applications for its IBM 370/OS system. \$1,000. FEE PAID

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For details, send resume or must your contact information to either D.L. Tait or F.X. McGinty.

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Develop your analysis skills in a booming energy company. This new position is primarily analysis with a minimum of programming. The key is financial applications experience in COBOL. Full range of company benefits.

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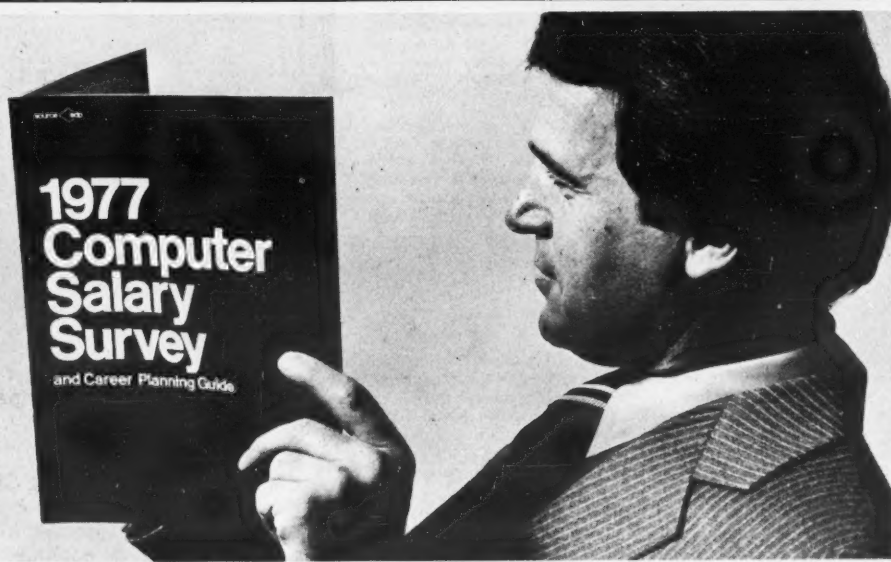
The Professional Approach To Career Planning**The New 1977 Computer Salary Survey****Call for your free copy today!**

A successful career in today's computer field requires the same professional planning you'd use in developing a new program or system. Each step must be carefully planned to make sure you reach your career objectives on time while avoiding costly side-tracks. That's where the computer professionals at Source EDP and their new report, the 1977 Computer Salary Survey, can help you.

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Detroit 313/352-6520
Kansas City, Mo. 816/474-3393
Minneapolis 612/544-3600
St. Louis 314/862-3800

South/Southwest
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Dallas 214/387-1600
Denver 303/773-3700
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Houston 713/626-8705
New Orleans 504/561-6000

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Palo Alto 415/328-7155
San Francisco 415/434-2410
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If unable to call, write:

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721 Enterprise
Oak Brook, Illinois 60521

When writing please be sure to indicate home address and current position title.

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DP INSTRUCTORS FOR NEW YORK & DEARBORN

Boeing Computer Services, a subsidiary of The Boeing Company has immediate requirements for specialists to develop, maintain and teach data processing courses in customer personnel.

The BCS Education and Training Division is seeking candidates for important assignments in New York and Dearborn, Michigan. Some travel will be required.

New York—Project/Systems Analyst Instructor

Candidates must have at least two years experience as a DP Project Manager or Systems Analyst. Structured design or structured programming experience is desired.

Dearborn, Michigan—Structured Programming Instructor

Structured programming experience is required. At least two years experience as a COBOL programmer is desired.

BCS is young, but a "major" in the computer services industry and offers outstanding career potential. Attractive salary, fringe benefits and relocation allowances will be offered qualified candidates.

Please send your résumé to The Boeing Company, P.O. Box 3707-JBC, Seattle, WA.

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BCS

BOEING COMPUTER SERVICES, INC.

SYSTEMS PROGRAMMERS

We offer opportunities to participate in the design and development of on-line transaction processing software. You would also be involved with software interfaces to data base management systems. Main emphasis would be placed on gaining knowledge of internal systems design characteristics in preparation for introduction to the customer market. Candidates would be working with a software development team engaged in transaction processing software development for the NCR Century and Criterion processors.

To qualify for these outstanding positions, candidates would have a technical or computer science degree. 4 - 6 years experience in software development projects is required. A thorough knowledge of operating systems, assembler language programming and real-time concepts are among the qualifications you would possess.

SYSTEMS ANALYSTS/ PROGRAMMERS

We are looking for manufacturing control systems analysts/programmers to participate in the development and installation of NCR's manufacturing control systems. Main emphasis would be placed on gaining knowledge of internal systems design characteristics in preparation to market the system. Candidates would be interfacing directly with the developing MIS organizations in order to gain the necessary expertise to upgrade the systems modules to NCR's new Criterion computer line.

To qualify you would have 3-5 years experience designing and programming manufacturing systems that include bills of material, material requirements planning, inventory control, standard routing, etc. Experience utilizing on-line transaction processing software, data base management systems and COBOL programming is a requirement. A definite plus would be experience with large scale development projects requiring formal project planning and professional systems documentation.

Ideal candidates would possess a degree in business administration with an MBA being preferable.

To investigate these outstanding opportunities, write to:

NCR

Mr. Vernon L. Mirre
Corporate Executive &
Professional Recruitment
NCR Corporation
Dayton, OH 45479

An Equal Opportunity Employer

SYSTEMS ANALYST

Country Mutual Insurance Company is seeking a Systems Analyst with a minimum of two years of Property and Casualty experience. A person with American Agency System experience, experience in conducting studies and in determining systems specifications is preferred. Some travel is required. Salary commensurate with experience.

Submit resume in confidence to:

Jack Fowler

Director of Employment

Illinois Agricultural Assoc.

1701 Towanda Ave.

Bloomington, IL 61701

(309) 828-0021, ext. 2206

ITT GWALTNEY

Career opportunity with a leading meat packing company located in Tidewater Virginia is available for persons with the following qualifications:

Systems Programmer

2 to 5 years experience. Thorough knowledge of DOS/VS, CICS/VS, and BAL. DL-I experience a plus, but not required.

Senior Programmer/Analyst

3 years plus experience. CICS/VS and BAL. Manufacturing background with KL-I, RPGII or ANS COBOL a plus, but not required.

Please send resume plus salary history to:

ITT Gwaltney, Inc.

Industrial Relations Department

P.O. Box 489

Smithfield, Virginia 23430

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Data General

Route 9, Southboro, Massachusetts 01772

Telephone: 617-485-9100

MEMO

**TO: Senior Software Managers
and Developers**

**FROM: Bill Foster
Director of Software Development
Data General Corporation
Southboro, MA 01772**

In eight years Data General Corporation has grown to 5700 employees, world-wide, and last year our sales exceeded \$160 million. As a result of our dynamic growth and expansion I am looking for several key individuals to assist me in managing and implementing our software development efforts.

If your background and career interests match the positions outlined below, investigate these opportunities and let us demonstrate to you how your career progression will be accelerated and enhanced at Data General Corporation.

Manager, Software Development

You will be responsible for staffing and managing a large software organization chartered with the development of products for our ECLIPSE®, NOVA®, and microNOVA systems. Areas of developmental responsibilities include operating systems, languages and data base management. You will participate in the development of all applicable software strategies. Requisite background includes at least 10 years significant technical experience as a systems programmer, coupled with a minimum of 7 years' of software management experience. A BS in a technical discipline and an MBA are highly desirable.

Manager, Software QA

You will be responsible for the management and staffing of our software QA group, developing procedures to insure top reliability of current and new software products. Relevant experience in systems software development on small products. Relevant experience in systems software development on small systems and a minimum of 2 years' experience in software QA management is required, preferably with a BS in Computer Science or the equivalent.

Manager, Performance Measurement

You will be responsible for staffing and managing a group developing software performance measurement tools and terminal simulators for system load testing. Relevant experience in developing performance measurement products is required, preferably with a BS in computer science or the equivalent. A post-graduate degree is preferred.

Data Communications Programmers

You will participate in the development of Data General network software. This responsibility will also encompass communication software to mainframes and to intelligent terminals. Relevant data communications experience is required, together with a BS degree in computer science or the equivalent. A post-graduate degree is preferred.

If you are interested in one of the above positions please call me at (617) 485-9174 this Monday, Tuesday or Wednesday. If you prefer, mail your resume in confidence to Alan Price, Data General Corporation, Route 9, Southboro, MA 01772.

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Data General

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<p>Data Processing Manager</p> <p>An electrical equipment manufacturer seeks a key member of the management team to take full responsibility for operating systems, programming and operations - staff of 13.</p> <p>The qualified manager will have manufacturing installation experience needed for developing and implementing on-line manufacturing information systems. BOM and MRP experience highly desirable.</p> <p>The creative shirt sleeve manager should send his resume to:</p> <p>Controllers Office Ward Leonard Electric Co., Inc. 31 South Street Mount Vernon, N.Y. 10550</p>	<div style="text-align: center;">  <h1>DALLAS</h1>  </div> <p>Improve your future when you join E-Systems. E-Systems is a leader in reconnaissance and intelligence gathering systems, electronics surveillance and other defense programs of a passive nature. We're a high technology systems company with annual sales of over \$250 million. We market products and services in more than 40 different countries. Our stock is listed on the New York Stock Exchange. You'll own some of that stock if you come with the E-Team.</p> <p>Make a good living where the living is good. There's no question — living is good in the Dallas area. Our public school systems have earned national recognition for excellence. We're one of the fastest growing areas in the nation, yet our housing dollar still buys considerably more home in Dallas than it would in most other metropolitan areas. We're surrounded by lakes, and blessed by beautiful weather year 'round. We back professional, university, and high school athletic teams, and we support our symphony, theaters, the civic opera and several museums. But, best of all, most of us are down home friendly people.</p> <p>Product Software Programmers</p> <p>Computer science professional with three or more years of real time programming experience using ALC on large scale and 16-bit mini-computers. You will be involved in program development, design, and analysis for large scale multi-tasking systems in advanced technology electronics. If you have had actual experience in product software programming, have a stable employment history, and a record of professional achievement, mail your resume today.</p> <div style="text-align: center;">  <p>E-SYSTEMS Garland Division An equal opportunity M/F employer US Citizenship Required</p> </div> <p>If you qualify, send your resume with salary history to: Computer Science Manager E-Systems, Inc. P.O. Box 6118/Dallas, Texas 75222</p>		<p>PROGRAMMER ANALYST</p> <p>Min 2 yrs systems design & analysis exp. Bkgd should include RPG II prog, mfg, systems + sales analysis systems. \$16K. fee paid. Contact P. Siegal (in confidence).</p> <p>ROBERT HALF PERSONNEL AGENCIES 1310 Liberty Bank Bldg Buffalo NY 14202 (716) 842-0801</p>	<p>INFORMATION SYSTEMS TRAINER</p> <p>Analyze requirements, design, teach, coordinate and evaluate technical DP training courses for State and Local government personnel. Must have: training experience, DP experience-minimum four years within the last six, COBOL programming (2 yrs.), business systems (2 yrs.), well-developed written and oral communication skills. Degree preferred. Salary range \$15,000 to \$19,000.</p> <p>Send resume by February 7, 1977 to P. Morgan, State of Oregon, DSD-ISTS, 240 Cottage St., SE, Salem, Oregon 97310 an Equal Opportunity Employer</p>
<p>PROGRAMMERS</p> <p>Needed for NCR Century 251 on-line service bureau, with 2-3 years NEAT/3 LEVEL II experience. Salary requirements with experience. Send resume to:</p> <p>Financial Computer Services 666 Euclid Ave., Rm. 610 Cleveland, Ohio 44114</p>				
<p>DP PROFESSIONALS</p> <p>All Positions Fee Paid</p> <p>PROGRAMMER/ANALYSTS 1-4 years ALC or COBOL. Banking or Manufacturing. Current openings in Texas, Oklahoma, Arkansas, Louisiana and Florida.</p> <p>MINI-COMPUTER PROGRAMMERS 1-10 years Process Control or Real Time Command & Control. UYK-15 or HP-21 MX.</p> <p>Dunhill Employment Agency of Fort Worth, Inc. 901 Ridglea Bank Bldg. Fort Worth, Texas 76116 (817) 732-8191</p>				<p>COMPUTER CENTER DIRECTOR</p> <p>Seeking sharp individual to manage all computer center activities. B.S. or higher degree in math, comp. sci., or related fields. Masters preferred. 1-4 years systems analysis and programming experience. DP supervisory experience desirable. Heavy ANS COBOL experience. Salary range: \$14,000-\$18,000. Application deadline: Jan. 28, 1977. Beginning date: Feb. 1, 1977. Contact: Affirmative Action Officer, Motlow State Community College, Tullahoma, TN 37388. EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER. (615) 455-8511, Ext. 248.</p>

SYSTEMS ANALYSTS/ PROGRAMMERS

For Division Headquarters in Dayton, Ohio

Does the thought of participating in the design and programming of an all new On-Line System for Retailers, including related applications support software and utilities excite you? If it does, and you possess a Bachelor's degree and/or responsible on-line or remote batch experience, your career with NCR may be about to begin.

For more information concerning this exciting opportunity, our excellent employee benefits and relocation package, send your resume with salary history in confidence to:

Mrs. Alice Freauf
Marketing Placement
Dept. 2080
NCR Corporation
Dayton, Ohio 45479

NCR

An Equal Opportunity Employer

SENIOR SYSTEMS PROGRAMMER

Boston based insurance company seeks an experience systems programmer to participate in several challenging projects within a highly sophisticated large scale IBM environment.

You will assist in evaluating and installing an attached processor to one of our two IBM 370-158's. You will also be responsible for implementing MVS and researching the feasibility of installing an IBM 3850 Mass Storage Device.

You must possess a minimum of three years experience with sysgens and utilities in an OS or MVS environment. A solid background in BAL is essential. Exposure to HASP, TSO, and VS is a plus.

We offer competitive salaries, an excellent fringe benefit package and relocation assistance.

To apply please send a resume and salary requirements in confidence to Paul Rigney, Commercial Union Assurance Company, One Beacon Street, Boston, MA 02108, or call (617) 725-7083.



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(312) 297-4410
CLEVELAND-20950 Center Ridge Rd., Rocky River, Oh. 44116
(216) 333-9440
DALLAS-1111 W. Mockingbird Ln., Dallas, Tx. 75247(214) 638-5081
DETROIT, 30100 Telegraph Rd., Birmingham, Mich. 48010
(313) 647-7400
HOUSTON-9800 N.W. Freeway, Houston, Tx. 77092
(713) 681-8485
LOS ANGELES-10880 Wilshire Blvd., L.A., Cal. 90024 (213) 475-8601
PHILADELPHIA-1150 First Ave., King of Prussia, Pa. 19406
(215) 337-0170
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Mini-Micro Computers

We are seeking several Programmers to support our rapidly expanding new business development involving high technology, government, and industrial mini/micro computer applications for process management, control and monitoring.

These positions require 1-5 years experience in real-time, mini/micro computer based systems including coding and debugging of program modules utilizing assemblers, editors, debuggers, and monitors. Knowledge of TI 990 and Intel 8080 desirable.

We are located in Fairfax, Virginia, a suburb of Washington, D.C. Interested applicants may submit resumes in confidence to B. Haydt.

LOGICON, INC.

P.O. Box 616
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Product Specialist

Unprecedented growth has created a Product Specialist position in National's Memory System Division. The ideal candidate will have an AA degree plus four or more years experience in providing customer technical support involving CPU's, channels, memory or high speed I/O peripherals. Some experience or training on IBM 370 systems preferred.

Our Product Specialist will play a key role in providing technical liaison between the customer and company and will provide data concerning maintainability, quality and engineering items to appropriate departments. Some travel.

To discuss this position...

...call Bob Hasselbrink COLLECT at (408) 737-5640, or forward your confidential resume with full details to his attention, 2900 Semiconductor Drive, Santa Clara, California 95051.

We are an affirmative action equal opportunity employer male and female.



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SOFTWARE SPECIALISTS

Fresno County

The newly reorganized Computer Services Department is offering outstanding career opportunities for professional systems programmers.

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Systems Programmer III: req. 2 yrs. systems programming experience. \$1456-\$1670

Contact:

Paul Patterson
Fresno County Personnel Dept.
Room 102, Courthouse
Fresno, CA 93721
(209) 488-3364

SYSTEMS ANALYST

Company is a leader in its field of specialized insurance. Forming a new department to design applications for its IBM 370/OS system. A vigorous and growing MIS dept. \$23,000. FEE PAID

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PERSONNEL SERVICES
522 Fifth Ave.
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(212) 221-6500

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Fortune 300, New York State Corp., seeks Project Manager to supervise and participate in design and implementation of MRP, Finished Goods Inventory, and other Manufacturing Systems. Will select Analysts and Programmers in the \$18-22,000 range to build up this new group. Must be an excellent communicator, lots of top level interface. Good growth potential, top benefits, dental, etc.. For details, contact D.L. Tait

(914) 946-1227
Tri-State Staffing Assoc. Inc. (Agy)
One N. Broadway
White Plains, NY 10601

SENIOR SYSTEMS ANALYST

SUNY four year college seeks well experienced systems analyst to assume total responsibility for administrative systems development and implementation. Must have a Bachelor's Degree, four years of successful development and installation of typical college applications (admissions, student records, finance, personnel, NCHEMS) or equivalent. Administrative processing is performed on campus B 4700. Position directs two COBOL programmers, requires expert programming skills and reports to Director, Computer Center. On-line and data base experience desired. Forward resume, salary history, references by February 1 to Phyllis Sholtys, Chairperson, Search Committee, State University College, Fredonia, New York 14063. Position to be filled by April, 1977.

The college at Fredonia with 5,000 students is in the western part of New York on Lake Erie. Salary is competitive; excellent fringe benefits.

SUC Fredonia is an Equal Opportunity and Affirmative Action employer.

INFORMATION SYSTEMS MANAGER

The University of Georgia is seeking a data processing professional to manage its Financial Information Systems Department. Experience must include: supervision of systems and programming personnel, computer based information systems design, data base design, large scale computing. Familiarity with IBM 370/158, OS/VS or MVS, IMS, TSO desirable. Send applications, resumes, reference names, and salary history to the Manager, Personnel Department, University of Georgia, Athens, Georgia 30602. An Equal Opportunity-Affirmative Action Employer.

Project Leaders Programmer/Analysts

A consulting and computer services company specializing in the design and implementation of material requirements planning systems is seeking individuals with programming and systems backgrounds in manufacturing applications. Cobol a must, BAL & data base experience a plus. Excellent salary/company benefits and an ideal location. Please send resume, including references to:

Michael E. Godfrey
Mgr. Manufacturing Implementation
Arista Information Systems, Inc.
P.O. Box 12339
Winston-Salem, N.C. 27107

Arista

DIRECTOR TECHNICAL SERVICES

Continue your career on the forefront of Computing and Computer Networking as part of the overall role of the IUPUI Computing Services Division.

Responsibilities include analysis, design and implementation of applications projects, consultative and client services, and systems software development.

Major equipment at Indianapolis includes a DEC-10 (KL) and an IBM 360/44; major equipment also accessed includes a CDC 6600 and an IBM 370/158 in Bloomington. (The DEC, CDC, IBM systems are part of the eight-campus Indiana University Computing Network.)

The section's professional, technical and clerical staff numbers approximately twenty-five and supports diverse activities from the academic community of this 20,000-student campus and medical center.

Qualifications: Graduate degree preferred (Medical/Math/Science) plus a successful supervisory and managerial experience in computing of at least five years.

Send Resume and Salary History to:

INDIANA
UNIVERSITY
PURDUE
UNIVERSITY



at INDIANAPOLIS

Personnel Office
1100 West Michigan St.
Indianapolis, Ind. 46202
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Programmer Analyst Programmer, Senior

One of Virginia's largest financial institutions is currently seeking qualified candidates to add to their expanding Corporate Systems Staff. Applicants should have four to six years of practical experience in programming and/or analyst work. We are an IBM 370/158 shop, OS/Vs I, Cobol, JCL.

We offer competitive salaries, excellent working conditions, a comprehensive fringe benefit program as well as challenging and rewarding work in an environment conducive to progression and promotion from within.

Submit resume giving educational and work background as well as salary requirements to:

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Richmond, Virginia 23261
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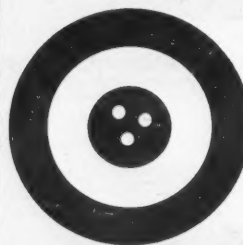
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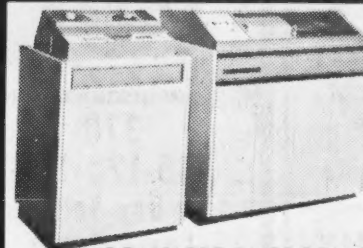
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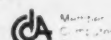
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <h2 style="text-align: center;">FOR SALE</h2> <h2 style="text-align: center;">IBM 059-02</h2> <p style="text-align: center;">"Liquidation Sale"</p> <p>Eligible for IBM M/A Refurbished Immediate Delivery</p> <table border="0" style="width: 100%;"> <tr> <td>Purchase</td> <td style="text-align: right;">\$1500</td> </tr> <tr> <td>Lease</td> <td style="text-align: right;">\$40</td> </tr> <tr> <td>Lease/Purchase</td> <td style="text-align: right;">\$52</td> </tr> </table> <p style="text-align: center;">Call While They Last! Jim Carleton CMI CORPORATION 23000 Mack Avenue St. Clair Shores, MI 48080 (313) 774-9500</p> </div> <div style="width: 45%;"> <h2 style="text-align: center;">COMPUTER DISK PACKS WANTED</h2> <p style="text-align: center;">ANY QUANTITY MOST TYPES TOP DOLLAR PAID</p> <p style="text-align: center;">(215) 284-0850</p> </div> </div>					Purchase	\$1500	Lease	\$40	Lease/Purchase	\$52
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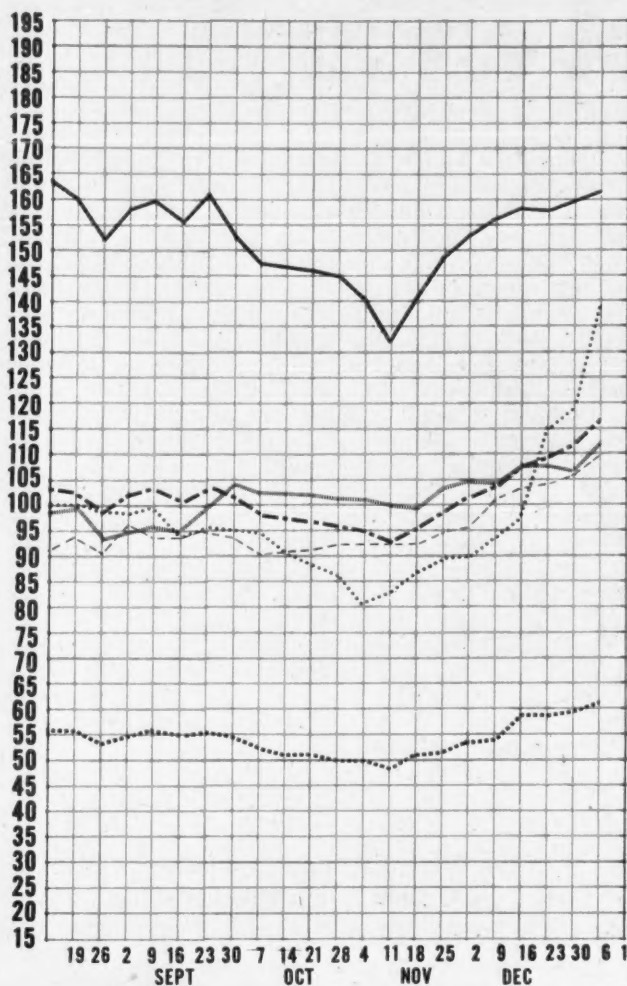
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	1976	1975
Shr Earnings	\$.90	\$.05
Revenue	5,410,000	4,300,000
Earnings	533,000	32,000

SYSTEM ENGINEERING LABS

Three Months Ended Sept. 24

	1976	1975
Shr Earnings	\$.08
Revenue	6,002,000	\$2,842,000
Tax Cred	132,000
Earnings	156,000	(591,000)

TELEX

Three Months Ended Sept. 30

	1976	1975
Shr Earnings	\$.04	\$.15
Revenue	22,753,000	24,935,000
Tax Cred	270,000	609,000
Earnings	434,000	1,675,000
6 Mo Shr	.15	.34
Revenue	47,355,000	52,443,000
Tax Cred	709,000	1,244,000
Earnings	1,572,000	3,647,000

VARIAN ASSOCIATES

Year Ended Sept. 30

	1976	1975
Shr Earnings	\$1.31	\$1.11
Revenue	341,569,000	310,444,000
Earnings	9,424,000	7,705,000
3 Mo Shr	.43	.31
Revenue	90,359,000	81,080,000
Earnings	3,114,000	2,187,000

RAYTHEON

Three Months Ended Sept. 26

	1976	1975
Shr Earnings	(.000)	(.000)
Revenue	\$1.51	\$1.27
Earnings	604,198	548,272
9 Mo Shr	23,093	19,292
Revenue	1,775,385	1,650,249
Earnings	64,001	56,164

ANACOMP

Three Months Ended Sept. 30

	1976	a1975
Shr Earnings	\$.23	\$5.13
Revenue	2,929,466	2,983,064
Earnings	232,659	150,249

a-Restated. b-Adjusted for 25% stock dividend in April 1976.

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Computerworld Stock Trading Summary

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O ANDAML CORP.	23-40	37	-2	-5.1
N BURROUGHS CORP.	94-108	88	-1/2	-0.5
O COMPUTER AUTOMATION	10-20	18 3/4	0	0.0
N CONTROL DATA CORP.	18-27	25 1/8	-1/8	-0.4
O DATA REVELL CORP.	40-60	43 3/4	+1	+2.3
O DATAPoint CORP.	24-46	28 1/2	0	0.0
O DIGITAL COMP. CONTROL	2-7	7	+1/2	+7.6
N DIGITAL EQUIPMENT	46-60	51 1/4	-2	-3.7
N ELECTRONIC ASSOC.	2-5	3 1/8	+7/8	+38.8
A ELECTRONIC ENGINEER.	7-16	9	+1	+12.5
O FOUR-PHASE SYSTEMS	13-21	16 3/4	+2	+13.5
N FOXBORO	28-51	48	-1	-2.0
O GENERAL AUTOMATION	4-11	8 1/8	0	0.0
O GRI COMPUTER CORP.	1-1	1 1/2	0	0.0
N HEWLETT-PACKARD CO.	80-117	83 3/4	-1/8	-0.1
N HONEYWELL INC.	34-56	47 1/4	+1 1/4	+2.7
N IBM	227-288	274	+3 3/4	+1.3
O MANAGEMENT ASSIST.	1-9	7	-1/2	-6.6
O MEMOREX	17-33	24 3/4	+1 3/8	+5.8
O MICRODATA CORP.	10-28	14 1/2	-3 1/8	-17.7
O MODULAR COMPUTER SYS.	3-14	5 5/8	+3/4	+15.3
N MCR	24-38	37 7/8	+2 3/8	+6.6
O PRIME COMPUTER INC.	4-18	16 3/4	0	0.0
N PERKIN-ELMER	19-27	20 7/8	+7/8	+6.3
N RAYTHEON CO.	45-67	57 1/4	-2 3/8	-3.9
O SPERRY RAND	40-52	40	-3 1/8	-7.2
O SYCOR INC.	9-31	14	+1 3/4	+14.2
A SYSTEMS ENG. LABS	5-10	6 1/2	+1/2	+8.3
N VARIAN ASSOCIATES	12-17	15	+1 1/8	+8.1
A WANG LABS.	11-20	14 3/4	+3/4	+5.3

LEASING COMPANIES

O BODINE COMPUTER CORP.	1-8	7 7/8	+1/4	+3.2
O COMDISCO INC.	3-10	9 1/2	+1/2	+5.5
A COMMERCE INDUS. CORP.	2-3	2 1/8	+1/2	+30.7
A COMPUTER INVESTS. GRP.	1-3	1 5/8	+1/8	+8.3
A DATARIC RENTAL	1-8	1 3/4	+5/8	+55.5
A DCL INC.	1-1	7/8	+1/8	+15.3
N DPE INC.	5-8	7 3/8	+3/4	+11.3
N ITEL	6-15	12 5/8	+5/8	+5.2
N LEASCO CORP.	6-20	19 1/2	+1 1/2	+8.3
O LEASPCOR CORP.	0-1	3/4	+1/4	+50.0
O NRG INC.	0-1	3/16	+1/16	+50.3
A PIONEER TEX CORP.	6-9	7 1/2	+1/8	+1.6
N U.S. LEASING	7-12	11	+3/4	+7.3

SOFTWARE & EDP SERVICES

O ADVANCED COMP. TECH.	1-3	1 5/8	-1/8	-7.1
O ANACOMP INC.	6-11	7	+1/8	+1.8
A APPLIED DATA RES.	2-6	5 5/8	+7/8	+18.4
N AUTOMATIC DATA PROC.	17-35	28 1/2	+1/2	+1.7
O COLEMAN AMERICAN COS.	2-6	2 3/8	+1/8	+5.5
O COMPI-SERV NETWORK	3-10	9 3/4	+1	+11.4
O COMPUTER DIMENSIONS	3-7	6 7/8	0	0.0
O COMP. ELECTION SYSTEMS	5-9	5 3/4	+1/4	+4.5
O COMPUTER HORIZONS	1-2	1 1/4	0	0.0
O COMPUTER NETWORK	2-8	6 3/8	+1/8	+2.0
N COMPUTER SCIENCES	4-8	7 1/4	+1/4	+3.5
O COMPUTER TASK GROUP	1-2	1 1/4	0	0.0
O COMPUTER USAGE	2-6	2 3/8	+1/8	+5.5
O COMSHARE	2-9	5	-1/2	-9.0
O DATA DIMENSIONS INC.	2-5	4 1/8	-3/4	-15.3
O DATATAR	1-2	1 1/2	+1/8	+9.0
N ELECTRONIC DATA SYS.	12-18	17 1/2	+1 1/4	+7.6
O INFORMATIONAL INC.	1-1	1 1/8	0	0.0
O INSYTE CORP.	1-3	2 1/4	+1/8	+5.8
O IPS COMPUTER MARKET.	1-2	1	0	0.0
O KEANE ASSOCIATES	2-4	2 1/2	+1/8	+5.2
O KEYDATA CORP.	1-5	1 3/4	+1/4	+16.6
A LOGICON	3-8	7 1/4	-1/4	-3.3
A MANAGEMENT DATA	1-3	2	0	0.0
A NATIONAL CSS INC.	13-25	23 1/8	-3/8	-1.5
O NATIONAL DATA CORP.	4-7	6	+7/8	+17.0
A ON LINE SYSTEMS INC.	17-23	21 3/4	-1/2	-1.1
N PLANNING RESEARCH	3-5	4 1/8	+1/2	+13.7
O PROGRAMMING & SYS.	1-1	1 1/4	0	0.0
O RAPIDATA INC.	2-5	2 5/8	+1/2	+23.5
O REYNOLDS & REYNOLD	13-21	19 1/4	+1/2	+2.6
O SCIENTIFIC COMPUTERS	1-1	1 1/8	+1/4	+28.5
O TMSHARP INC.	14-28	19	+1/4	+1.3
A UPS SYSTEMS	3-5	3 7/8	0	0.0
N WVLY CORP.	1-7	2	+3/8	+23.0

PERIPHERALS & SUBSYSTEMS

N ADDRESSOGRAPH-MULT.	8-14	14 3/8	+1 3/4	+13.8
O ADVANCED MEMORY SYS.	4-10	7 3/4	-3/8	-4.6
N AMPLEX CORP.	5-10	8 3/8	+5/8	+8.0
O ANDERSON JACOBSON	2-4	3 5/8	+5/8	+20.8
O APPLIED DIG. DATA SYS.	13-25	14 1/4	-1 3/4	-10.9
O BEEHIVE MEDICAL ELEC.	3-11	10 3/4	+3/4	+7.5
A BOLT, REPANKE & NEW	7-11	7 1/4	+1/8	+1.7
N BUNKER-PAYO	5-10	8 5/8	-1/8	-1.4
A CALCOMP	4-7	4 3/8	+1/4	+6.0
O CAMBRIDGE MEMORIES	0-6	1	+1/8	+23.0
N CENTRONICS DATA COMP.	20-36	25 1/2	-1 3/8	-5.1
O CODEX CORP.	22-42	33	+2	+6.4
O COGNITRONICS	1-1	1	+1/4	+33.3
O COMPUTER COMMUN.	1-6	5 3/4	+1 3/8	+31.4
O COMPUTER CONSOLES	4-7	5	0	0.0
A COMPUTER EQUIPMENT	1-3	1 7/8	+1/8	+7.1
O COMPUTER TRANSCIVER	1-3	1 1/8	+1/2	+80.0
O COMTEN	4-11	10 5/8	+1	+10.3
N CONRAC CORP.	20-27	25	-3/4	-2.9

1976-77 CLOSE 2-WEEK 2-WEEK
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 (1) 1977 CHNGE CHNGE

O DATA ACCESS SYSTEMS	1-5	4 1/4	0	0.0
O DATA LOG	6-13	8	+5/8	+8.4
A DATA PRODUCTS CORP.	5-15	12 1/4	+5/8	+5.3
O DATA TECHNOLOGY	1-3	3 1/4	-1/8	-3.7
O DATUM INC.	1-2	1 1/4	+5/8	+55.5
O DECISION DATA COMPUT.	1-4	1 7/8	-1/8	-6.2
O DELTA DATA SYSTEMS	1-1	3/8	0	0.0
N ELECTRONIC M & M	1-4	3 1/2	-1/8	-3.4
O FABRI-TEK	1-1	1	+1/4	+33.3
O GENERAL COMPUTER SYS.	0-2	1/2	0	0.0
N HAZELTINE CORP.	4-12	9 3/8	+1/4	+2.7
N HARRIS CORP.	29-57	28 3/4	-27 5/8	-49.0
A INCODEX CORP.	9-20	13	+5/8	+5.0
O INFOREX INC.	3-7	6 1/4	+1/2	+8.6
C INFORMATION INTL INC.	10-18	13 7/8	+7/8	+6.7
O INTEL CORP.	27-109	53	-3	-5.3
A LINDY ELECTRONICS	3-7	3 3/4	+1/8	+3.4
O MSI DATA CORP.	3-7	6 3/8	-3/8	-5.5
N WILCO ELECTRONICS	15-22	20 7/8	+1/8	+0.6

N MCHAWK DATA SCI	3-10	6 3/8	+1/4	+4.0
O PENNELL CORP.	1-3	2	0	0.0
A PERTEC CORP.	3-8	7 3/8	+3/8	+5.3
A POTTER INSTRUMENT	2-2	1 3/4	0	0.0
O PRECISION INST.	2-10	1 1/2	0	0.0
O QUANTOR CORP.	4-6	5	-1/8	-2.4
O RECOGNITION EQUIP.	6-11	9 5/8	-1/4	-2.5
N SANDERS ASSOCIATES	6-11	11	+1 1/2	+15.7
O SCAN DATA	1-4	1 1/2	+1/8	+9.0
O STORAGE TECHNOLOGY	9-13	11 1/4	+5/8	+5.8
O T RAP INC.	5-10	7 1/4	+3/8	+5.4
O TALLY CORP.	4-6	5 3/4	-1/8	-2.1
O TEC INC.	3-9	8 3/4	-1/4	-2.7
N TEKTRONIX INC.	45-69	66 1/2	+2 3/4	+4.3
N TELEX	2-5	2 7/8	+3/8	+15.0
O WANGCO INC.	11-22	17 1/2	-1/2	-2.7
O WILTEK INC.	2-2	1/8	-5/8	-83.3

SUPPLIES & ACCESSORIES

O ADVANCED SYSTEMS INC.	1-4	3 1/4	0	0.0
O BALTIMORE BUS FORMS	3-5	3 1/2	+1/4	+7.6
A BARRY WEIGHT	6-11	10 7/8	+1/8	-1.1
O CYBERNETICS INC.	0-1	5/8	+1/8	+25.0
A DATA DOCUMENTS	23-45	44 1/4	-3/4	-1.6
O DUPLEX PRODUCTS INC.	13-24	14 7/8	+1 3/8	+10.1
N ENNIS BUS. FORMS	6-8	6 5/8	+3/4	+12.7
O GRAHAM MAGNETICS	8-13	11 1/4	+1 1/4	+12.5
O GRAPHIC CONTROLS	13-19	15	+1/4	+1.6
N 3M COMPANY	53-66	55 1/4	-7/8	-1.5
O MOORE CORP. LTD.	32-51	36 1/4	+1	+2.8
N NASHUA CORP.	11-20	17 7/8	-5/8	-3.2
O STANDARD REGISTER	15-19	18 1/4	-1/4	-1.3
O TAB PRODUCTS CO.	5-13	13	+1 1/2	+13.0
N UARCO	19-25	22 1/8	+5/8	+2.9
A WARASH MAGNETICS	4-11	11 1/8	+7/8	+8.5
N WALLACE BUS FORMS	19-25	21 1/8	+1/2	+2.4

EXCH: NEW YORK: A=AMERICAN; P=PHIL-HEAL-WASH
 L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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